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THE

ARTICULATIONS

OF

SPEECH SOUNDS

REPRESENTED BY MEANS OF

ANALPHABETIC SYMBOLS

BY

OTTO JESPERSEN.

MARBURG IN HESSEN
N. G. ELWERT.
1889.

PREFACE.

Those readers who will refer to the *Kort udsigt over det philologisk-historiske samfunds virksomhed* (Copenhagen, 1882—84, p. 49), will find that on the 1st of May, 1884, I read a paper *Om lydskrift*, where I set forth the outlines of a new system of sound notation. In the same year I had, when reviewing Hoffory's *Streitschrift* in the *Nordisk tidskrift for filologi* (N. r. VI, 322), an opportunity for expounding my views on the possibility of a general system of speech sounds and on similar questions of what I termed linguistic metaphysics; some of these considerations have been inserted in the following pages. Since then I have been constantly extending and modifying my system of writing sounds and their elements; a last modification will be found in the Appendix, s. v. mixed.

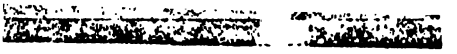
As my object in writing this little volume has not been to give a full treatise on phonetics for the use of beginning students, but rather to suggest to professional phoneticians a new solution of the old problem of a standard notation, I have not treated the several sections of the phonetic science according to their intrinsic importance, but have dealt at some length with those chapters on which I had new observations or new theories to advance, passing more rapidly over such subjects as my predecessors have already done full justice to. — The transcription with Roman letters, used here and there, is a variety of 'Broad Romic' requiring no special explanation; printing in italics means wideness when applied to a vowel, but some change in the glottis, generally voicelessness, for the consonants.

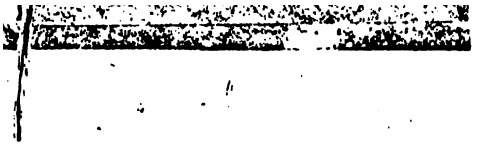
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I must here apologize for a few inaccuracies in the references to paragraphs; when the work was already half through the press, I shortened considerably the last section of it, cutting out especially my analysis of many diphthongs as being, perhaps, of too precarious a nature.

My best thanks are due to Professor A. H. Keane of the University College, London, for his most valuable assistance in correcting the proof-sheets.

Copenhagen, April 1889. Otto Jespersen.

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I.

PRINCIPLES.

> As long as we are hampered with makeshift adaptations of the Roman alphabet, our advance will continue to be a mere crawl.
> Sweet, *S. N.*, 185.

§ 1. It is surely needless here to set forth the utility, nay the necessity of a thorough knowledge of phonetics for all those, who study languages either in their historical development, or simply in order to use them as a means of communication with people of different nationalities. But how is it that the phonetic science, acknowledged as its importance seems to be by everybody, has gained so little ground, and is still very far from having penetrated the minds of all linguists so as to be not only nominally, but essentially, the basis of all linguistic work? No doubt several reasons could be advanced for this fact, but I can hardly be mistaken in naming, as one of the most powerful, the want of a universally accepted notation and terminology. No two authors use exactly the same transcription; in fact, many use two or three different systems — the consequence being that the same symbol has two, three or more significations, and that the same sound is written almost in a new way by every new phonetician. Thus, to take only one instance, we find the French nasal *a* transcribed in at least 11 different ways:

1) ą (Lundell, Sievers, Vietor),
2) ą (Breymann),
3) ą (Toussaint-Langenscheidt),
4) a? (Trautmann),
5) å (Storm, Franke, Beyer, etc.),

6) *aq* (Sweet, *Hdb.*),
7) *an* (Sweet, *Sound Not.*),
8) a N (Passy, *Sons du Français*),
9) a *A* (Ellis, *Palaeotype*),
10) ahn' (Ellis, *Glossic*),
11) a: (Noreen).[1]

§ 2. If we turn to the phonetic nomenclature, we find the same bewildering confusion. Every author seems to think himself authorized to use old words, such as *dental, guttural, oral* and so forth, according to his individual fancy, and to coin new terms just as he likes. The Latin prepositions *ante, pro* and *post* are always ready at hand, and where they do not suffice, compounds such as linguopalatal or palatolingual or medioalveolar, are easily formed. Indeed, if this tendency is not soon put an end to, I think we shall some day or other find ourselves talking about medio-linguodorsopræpalatal unilateral sounds! (γ ɪᵉ). Now Condillac goes certainly too far in defining science as »une langue bien faite«, but the importance of an exhaustive and unambiguous terminology can hardly be overrated, and we must confess that the science of speech-sounds is very badly off in that respect, as will easily be seen by a glance at the alphabetic list appended to this paper.

§ 3. The following is an attempt to remedy this defect by applying to phonetics an idea expressed by Gaidoz with regard to another science: »L'anthropologie, says he, n'aura une langue vraiment scientifique que lorsqu'elle adoptera une notation analogue à celle de la chimie, et qu'au lieu de parler de race celtique, ou de race germanique ou de race slave, termes chimériques et faux, elle représentera dans un monogramme de lettres et de chiffres le crâne, l'angle facial, les cheveux, les os longs, etc., de la race humaine qu'elle veut déterminer, comme le chimiste représente par un monogramme de lettres et de chiffres la nature d'un composé chimique.« (*Revue Critique*, 11. déc. 1882.)

[1] Cf. Beyer, *Lautsystem des Neufrans.*, Cöthen 1887, p. 58. — Lyttkens and Wulff, in their excellent Swedish '*Ljudlära*' give under each sound a 'synonymic' list of the manner in which the sound has been written by the leading phoneticians. A complete synopsis of sounds and symbols would be a boon to the philogical world, but I am afraid that the typographical and other difficulties are insurmountable.

If these monograms are conveniently devised, they will supply at once a good notation and a good nomenclature. But what is to be the basis of such a system for our science?

§ 4. The ordinary Roman letters with values similar to those attributed to them in our general alphabet are quite out of the question, because of their irrationality, and more especially of the multitude of cross-associations they cause; this has been so clearly demonstrated by Dr. Sweet (*Handbook of Phonetics* 1877; *Sound Notation* in *Transactions of the Philol. Soc.* 1881) that I need not add a single word in corroboration of his excellent disquisition.

The acoustic science, taken either as the science of sounds in themselves and independently of human hearing or as the science of the human ear and its perception of sounds, is, at least in its present state, quite unable to furnish us with a system of notation. Not even the best graphical representation of sound-curves can, in every case and with sufficient clearness, serve to distinguish sounds which in the languages are kept perfectly distinct; and not even the most ardent adherents of the 'acoustic' point of view have ever tried to base their phonetic terminology or any system of notation on the acoustic properties of sounds.

§ 5. We are, therefore, reduced to starting from the manner in which speech-sounds are produced by actions of the lips, tongue, etc., in other words, our system must be purely physiological or *genetic*. Several 'organic' alphabets of this description have been proposed by German phoneticians, — alphabets which, by the way, do not encourage any further attempts, as they have all failed utterly to solve the problem of creating a notation which could serve as a means of mutual understanding among the phoneticians: they have been used by no one besides their authors, and by these only to a very small extent. The sound-analysis on which they are based, being, moreover, quite insufficient now-a-days, it will not be worth while here to examine their structure.

But with Melville Bell's *Visible Speech* the case is different. To this inventor and to his followers we owe most of the progress made in phonetic analysis, and his alphabet has been used successfully by Bell himself as well as by others for various purposes, such as describing the sound systems of several languages with great accuracy, and teaching deaf and dumb persons to speak. An exami-

nation of this system with special attention to the points in which it is deficient, will therefore be of use to indicate what to avoid and what to aim at in a new scheme.

§ 6. Most of the Visible Speech symbols fall into the two easily distinguishable classes of curves, used for consonants, and upright strokes, used for vowels. "By a happy contrivance" writes Mr. Ellis" the vowels have such a remarkably different appearance from the consonants, that they strike the eye at once, and hence determine the number of syllables of which the word consists". (Inaugural Edition of *Vis. Sp.*, p. 27.) I doubt whether now, twenty years after the first appearance of the Visible Speech, any phonetician would subscribe to this praise; for everybody now seems to see that no absolute line can be drawn between consonants and vowels, and that the number of vowels does not always coincide with that of the syllables. The great dissimilarity between the two classes of symbols is specially objectionable, because in many cases it necessitates two or even more different symbolizations of the same thing. Thus a voiced consonant naturally bears the same relation to the corresponding voiceless consonant as an ordinary [a] pronounced with voice, to a voiceless [a]; but in the Vis. Speech consonant-symbols voicelessness is implied and voice is indicated by a small stroke within the sign, while in the vowels voice is implied in the sign and voicelessness has to be symbolized by a "modifier" behind the symbol, a modifier which, however, not only modifies, but expressly denies the existence of something which has just been expressly asserted in the main symbol. — 'Rounding' is symbolized in three ways: by a short line drawn across the vowel stem, by two hooks in such consonants as the back-open (Germ. *auch*), and by an independent modifier following other consonant-symbols. — Similarly a comparison between the signs for narrow [u] and wide [*u*] on one hand and narrow [w] and wide [*w*] on the other does not at all show the parallelism, while the sign for nasality which makes a part of the [n] symbol, has to be suffixed independently to vowel signs. — Changes of position have been most ingeniously utilized to indicate the various articulating organs; but why does not the same rule apply to the vowels as to the consonants? If we write such a word as German *ach*, the back formation of the vowel is indicated by turning it to the left, but the back formation of the consonant

by turning it to the right. — Finally the function of a sound as syllabic or nonsyllabic is shown in one way with the consonants (modifier) and in another with the vowels (height of the symbol).

To sum up, we find a whole group of incongruities in the Visible Speech symbols arising from establishing beforehand a fundamental distinction between consonants and vowels, and it will be seen that most of these incongruities do not appear in the original system with the same clearness as in Dr. Sweet's revised Visible Speech.[1] It is, indeed, a consequence of the development of our science that many distinctions formerly supposed to belong to one class of sounds only are now applied to the other as well, and there can be little doubt that if Mr. Sweet, instead of patching up an older system, had to devise a totally new one, he would have avoided many of these inconsistencies. A Visible Speech deserving its proud name must show at a glance that "a lowered [j̝] is practically identical with a non-syllabic [i]" (Sweet, *Sound N.* p. 209, cf. p. 211 "relaxed [j̝]") — but this fact is completely disguised in *the* "Visible Speech".

§. 7. Another defect of the system is that the articulating organ and the place where it articulates are not indicated separately, one of the many places being regarded as the normal requiring no special denotation, and all others being indicated by modifiers. There is no reason whatever to consider, for instance, the place where an English [t] is formed, as more normal than that where the French [t] is produced, and thus to establish a sort of rank between the sounds. This is also a point which has been modified by Professor Graham Bell, who, at the meeting of the Philological Society of London on the 3d of December, 1880, said, "that Visible Speech had been found to require extension. One improvement was to symbolize the upper and lower organs (such as the palate and the tongue) separately, denoting the former by small symbols written above the corresponding symbols of the lower positions".[2]

Mr. Sweet has also made some alterations in this respect, thereby correcting Mr. Bell's analysis of [f] and [p] as 'divided'; but he seems hardly consistent in not providing corresponding characters for the lip-teeth shut and the point-teeth shut consonants.

[1] *Sound Notation.*

[2] *Monthly Abstracts of Proceedings*, 1880, p. 42.

§. 8. If these imperfections and inconsistencies are looked at more closely, it will be found that all of them spring from one leading principle; they are, in fact, the effect of what might be termed the *alphabetic* character or rather tendency of the system. The elementary symbols denoting the concurrent actions of the organs of speech are as far as possible joined together in one complex sign; and each of such complex signs plays very nearly the same part as a single letter in our common alphabet, standing for a single sound. Now the joining together is comparatively easy when only few of the component articulations are taken into consideration; but when minute shades, that have been hitherto disregarded, are taken into account, it becomes practically impossible to indicate all the components by one single sign; then recourse must be had to secondary signs following the principal ones, an expedient which makes the whole of the system cumbrous and inconsistent, in so far as some signs stand for whole sounds and others for parts of sounds; the succession of two signs sometimes means sequence in time, sometimes simultaneousness.

§. 9. It seems evident that in a perfect notation a rounded *i* [= y] has no more claim to a single symbol than, for instance, a rounded *r*; one sound is as complex as the other. Nay, it may be safely assumed that the ordinary distinction of compound sounds and simple sounds is quite untenable, at least from the 'genetic' point of view. All sounds are equally compounds. If *b* is simple, is *m* compound, because the passage through the nose is opened? Might we not with as much right pretend that *b* is more complex than *m*, because the organs have here one more movement to accomplish, the velum palati being naturally lowered when the organs of speech are inactive? — The simple sound [m] is physiologically the resulting consequence of the following conditions:

α. lips shut,
β. tongue-point resting in the bottom of the mouth,
γ. the surface of the tongue not raised towards the palate,
δ. nose-passage open,
ε. vibration of the vocal chords, and
ζ. air expelled from the lungs.

No one of these elements can be changed without changing the sound; if the point of the tongue is brought into contact with

the rim of the teeth as for [d], no [m] is formed, as it is one of the conditions for pronouncing it, that the air should have free passage up to the lips. It will now be seen that a simultaneous [m] and [n], assumed by Sweet (*Hb.*, p. 213) to be the last sound in the English word *open*, is impossible. (Cf. below, § 73).

§. 10. These and similar considerations lead to the conclusion that, in order conveniently and accurately to symbolize speech sounds, we must give up any idea of having a single character for each sound; we must, in fact, *symbolize not sounds, but elements of sounds*. The best manner of joining together the symbols for these elements will then evidently be to place the signs above and beneath each other on separate lines, one for the lips, another for the tongue point, etc.

The only attempt to carry out such a plan is that made by Dr. F. Techmer in his *Phonetik* (1880) and again in the first volume of his *Internationale Zeitschrift für allgemeine Sprachwissenschaft* (1884). He writes his signs on ten or more lines above each other for so many different *places* of articulation. It would have been far better to have had a separate line for each articulating *organ*, indicating by other means the place where it functions. The essential objection to the system is however, the utterly impractical character of the symbols used. It is difficult to decipher, not easy to write, and quite impossible to print, these signs, and the author does not even condescend to explain intelligibly what he means by them. In point of fact, the whole thing can scarcely be called a serious attempt at a real system of sound notation, for in 1880 the author had only got so far as writing by the help of it a Hottentot click, an unutterable Chinese word and "Ist es wirklich wahr?"; in 1884, the system had not yet got beyond these identical notations, and since then it has never been heard of.

§. 11. In comparison with this scheme Bell's elegant Visible Speech symbols have certainly many great advantages, and if we ask why in spite of these they have not been used more commonly by writers on phonetics and linguists in general, the answer must be: Not because of the inconsistencies and shortcomings pointed out above, for they are of a theoretical rather than of a practical nature and do not interfere with the numerous admirable features of the system, but more especially for two reasons. In the first place, the

system of notation and the author's views on the formation of the sounds are so closely connected that nobody can use the symbols, least of all the vowel symbols, without agreeing fully with Mr. Bell's analysis; the system leaves no room for heterodoxy, and most phoneticians *are* more or less heretical on this point.

Secondly, the use of the symbols involves many practical difficulties that should not be underrated. The characters can easily be written, but if I am not mistaken, only two printing offices in the world are able to print them. There is no telling what would be the circulation of Visible Speech, if its types were generally accessible; but as matters now stand, the typographical difficulties are too great. Those who know the system cannot make use of it in such writings as are meant for publication, and the great majority of phoneticians and quasi-phoneticians are deterred from learning it by its apparent strangeness and difficulty, and so it happens that such admirable papers as Dr. Sweet's on Sound Notation, on Russian, Portugueze and Welsh pronunciations are practically as unknown as if they had never been printed. In fact people go on for years quoting statements from the Handbook, which the author has since corrected or modified.

§. 12. The conclusions thus drawn from the shortcomings of previous schemes may be strengthened by a generalization from the history of writing in general. Primitive picture-writing, where each sign meant a whole sentence or a part of one, developed into ideographic word-writing; this was succeeded by syllabic methods which had in their turn to give place to alphabetic writing where each letter stands for, or is meant to stand for, one sound. It will be seen that each subsequent stage is an advance upon the previous with regard to the degree of phonetic accuracy possible to attain, and that this advance is due to a further analysis of language, smaller and smaller units of speech being progressively represented by single signs. Now it seems clear that if this evolution from phrase to word, from word to syllable and from syllable to sound, is to be carried on beyond the alphabetic stage, the next step will be an ultra-alphabetic or analphabetic system of writing, symbolizing not sounds, but elements of sounds. But this it not all. We further find that the change from one stage to the next has been rendered practically possible only by utilizing in a new sense the signs

already existing. Thus most of our letters can still be traced back to a time when they were used as pictorial signs for words. And we too must take this lesson to heart, if our system of writing sound-elements is to prove successful.

Even if the conclusions here drawn from the history of writing be true, it does not follow that the common writing of the future will be what I have called analphabetic. On the contrary it is far more probable that progress will go in quite another direction. What is most required in practical business life is shortness and speed, and these two qualities in connection with a fair amount of fidelity to the sounds, such as is necessary to make the system easily learnt, will be most conveniently attained by a stenographic system based, mainly if not exclusively, on syllabic principles. Such a system will, therefore, have far better chance of supplanting our present clumsy alphabet than any other, in which accuracy of sound-analysis is the principal object, even at the expense of brevity. And this is precisely the case wich the present scheme; it is so far from having any pretensions to being universally adopted for ordinary writing, that it cannot even be used conveniently where longer texts have to be phonetically transcribed. What it claims is merely to provide a means of writing down and describing phonetic minutiæ in a comparatively easy and unambiguous manner; it will be specially useful as a means of supplying a key for systems of transcription with our common letters adapted to particular sound systems, and of avoiding the defects of the usual phonetic terminology in discussions about the formation and history of speech-sounds. What it gives is not so much a set of readable symbols as half-mathematical formulas indicating the positions of the different organs, and thereby enabling the phonetician to calculate what sound is meant. It was consequently very adequate that the first authority to whom I showed the system, in 1884, compared it with the 'score' in which the director of an orchestra has the parts of all the different instruments written out beneath one another.

§. 13. Before passing on to the question *how* to symbolize the various actions of the organs, we must first have a clear notion of *what to symbolize*, and *what not*. Now it is self-evident that we need no signs for movements that are physiologically impossible; when, for instance, some authors tell us that in forming the North German

[v] "the upper teeth are drawn somewhat back" (etwas zurücktreten), or vice versâ that in the English and French [v] "the tips of the teeth are brought forward and laid upon the lower lip"[1], we can hardly be mistaken in ascribing such statements less to the mobility of the authors' upper teeth than to that of their imagination. (For the difference between these two articulations, see below, § 101).

§. 14. But there are other movements of the organs which, though being real, do not call for any symbolization, as they may or must be considered as necessary consequences of such processes as are already symbolized. To this class I reckon: (1) the different degrees in which according to Czermak the velum palati is raised for the different non-nasal vowels; (2) the moving forward of the back wall of the pharynx to meet the velum and the uvula and to assist them in shutting off the nasal cavities; (3) most, if not all, of the movements of the epiglottis; (4) the "inner" or "cheek" roundings: if the lip position is indicated with sufficient accuracy, the state of the cheeks is necessarily implied, as it is substantially dependent on the lips; it is impossible to "round" the cheeks without moving the corners of the mouth; (5) the raising and lowering of the larynx. When we pronounce a protracted voiced [b], the air that is compressed in the mouth without any exit, presses upon the vocal chords and so compels the whole of the larynx to sink as far down as it can. The same is the case, though not to the same extent, when [u] and, still less, when [i] is pronounced; here the aperture in the mouth is not wide enough to give passage to all the air coming through the glottis, consequently the larynx moves down, and it does so more with [u] than with [i], because in the latter the space between the glottis and the mouth-narrowing is longer.[2] On the other hand, when the glottis is firmly shut (as for the 'glottal catch', ε 0) while air is driven out of the lungs, the larynx is raised, especially if the

[1] Hoffory, Kuhn's *Zeitschr.* XXV, 425; Whitney, *Life and Growth of Language*, 1875, p. 64. — Molière, *Le Bourgeois Gentilhomme* II, 6: L'F, en appuyant les dents d'en-haut sur la lèvre de dessous, FA.

[2] According to the general opinion the larynx is raised in pronouncing [i]; but this does not agree with my observations; but of course when [iiuu] is pronounced, the position for [ii] is *comparatively* higher than for [uu]. — I cannot here enter into the subject of movements of the larynx in singing higher or lower notes.

mouth is open; but in both cases the up and down movement of the larynx is a purely physical action of the air on the vocal chords; no muscles are in activity to produce it, consequently it is no more an articulation than is, for instance, the puffing up of the cheeks when the lip aperture is smaller than an aperture further back (as in blowing a bassoon and in pronouncing |w] or the Swedish [*w*] in *bo* (§ 123).

§. 15. To this class of movements which do not require symbolization, I am inclined to reckon also (6) the movements of the jaw. Great importance has of late years been attached to these movements by writers of such different schools as Trautmann and Sweet.[1] It must also be admitted that in passing through the vowels [i-e-æ] the lowering of the jaw appears to be the essential thing from what might be called the muscular point of view. But if we look at the manner in which the sound is moulded by the passage of the air through the organs, we see that the jaw itself does not play any part; the shape of the mouth channel is here all-essential, and that depends primarily on the distance of the tongue from the palate and on the lip positions. "The only articulative action of the movable jaw is to keep itself out of the way of the issuing sounds", justly remarks Mr. Melville Bell (*Sounds and their Relations* p. 93). A Sound Notation in which the tongue and the lip positions are accurately registered, can therefore do without signs for the lowering of the jaw; but, of course, if such signs can be easily embodied in the system, — which is the case with the Analphabetic, see below, § 19 — they can do no harm, and may even in some abnormal cases prove useful.[2]

§. 16. Finally, no symbols are required (7) for all such transitions between two positions as are unavoidable. When in writing the syllable [pa] signs for the two positions are given after each other, it is evident that the movements of lips, tongue and vocal

[1] See *Elementarbuch*[2] p. 13. „Diese entfernung geschieht hauptsächlich durch senkung des unterkiefers." Cf. also Western, *Engl. Lautlehre* p. 5 § 8 and p. 83—84.

[2] Compare for the jaw question Sweet, *Handbook* § 34; Techmer, *Int. Zeitschr.* I, 141, note (2); Sievers, *Grundzüge* 3[d] ed. p. 16 and 87 („beim gewöhnlichen sprechen fast gar keine praktische bedeutung"); Vietor, *Elemente* 2[d] ed. p. 16 and 26 („die stellung der zunge ein wichtigeres moment der artikulation als der von Trautmann hervorgehobene kieferwinkel)."

chords necessary for passing from one position to the other are unmistakably implied in the succession of the symbols. Those cases alone, where the transitional movements are other than the normal ones, have to be duly symbolized.

By thus discarding many things which, if taken into account in every special case, would have seriously impeded our work, we have now cleared the ground and can proceed to the erection of the edifice itself.

II.

SYMBOLS.

In a symbol there is concealement and yet revelation. Carlyle *Sartor Res.* III 3.

§. 17. General outlines of the system.

As already hinted above, everything that takes place in the several active organs of speech is written on separate *lines* above each other. These lines are numbered by the help of the Greek alphabet, α meaning the lips, β the tip of the tongue, and so on, proceeding inwards. On the lines are written *numerals* (Arabic and Roman) to indicate the size and shape of the configurative aperture; and to these numerals are added, by way of exponents, Roman letters, denoting the place of greatest narrowness. Here, as in the case of the Greek letters, we number the various positions a, b_1 c, etc., from the lips inwardly to the throat.

The various positions of these exponents indicate smaller divisions in the acting organs, for which it has not been found necessary to create separate lines.

Intermediate positions are indicated, in the case of the numerals, by the well known algebraic signs $>$ and $<$ ($<$ 1 not quite 1, $>$ 1 a little more than 1) or, if very great accuracy is aimed at, by fractions. In the case of the letters I have found it convenient to use bc = nearer b than c, cb = nearer c than b, etc.

It may here be added that it is often more convenient to write the different elements[1] on one line instead of on different

[1] Element is used in this paper in the sense of the action of one of the organs that cooperate to produce a sound.

lines beneath each other, so that, for instance $\alpha\ 5^b\ \beta\ 2^e$ is exactly equivalent to $\alpha\ 5^b$
$\beta\ 2^e$.

§. 18. Greek Letters (Lines).

As articulating organs each requiring a special line and, consequently, a special letter of the Greek alphabet, the following six are recognized:

α — the lips.
β — the point (tip) of the tongue.
γ — the upper surface of the tongue.
ϑ — velum palati, the soft palate, with uvula.
ε — the larynx with the vocal chords.
ζ — the respiratory organs (the diaphragm, etc.).

§. 19 Place of the Exponents.

Subdivisions under the three first heads (α, β, γ) are indicated by the different place in which the small (Roman) letters are put as exponents. To make this clear I use x as a general substitute for any numeral, and z as a general sign for any exponent letter.

The normal place for the exponent is above and behind the numeral (x^z); other positions show deviations according to the following rules:

$\alpha\ x^z$ = both lips articulating against each other.
$\alpha\ {}^z x$ = the upper lip alone active.
$\alpha\ {}_z x$ = the lower lip alone active.
$\beta\ {}^z x$ = the lower surface of the tongue.
$\beta\ x^z$ = the tip of the tongue.
$\beta\ x_z$, $\gamma\ {}^z x$ = the 'blade' of the tongue; $\beta\ x_z$ corresponds nearly to what Dr. Sweet calls 'blade-point', indicating that part of the blade which is nearest the tip, while $\gamma\ {}^z x$ is nearer the front position. By the $\beta\ x_z$ -articulations it is unnecessary to design the tip-position, as it is determined by the blade-position, while by $\gamma\ {}^z x$ the distance from the point is so great as to leave place for various positions of the tip.
$\gamma\ x^z$ = the outer half of the surface of the tongue ('front').
$\gamma\ x_z$ = the inner half of the surface ('back').

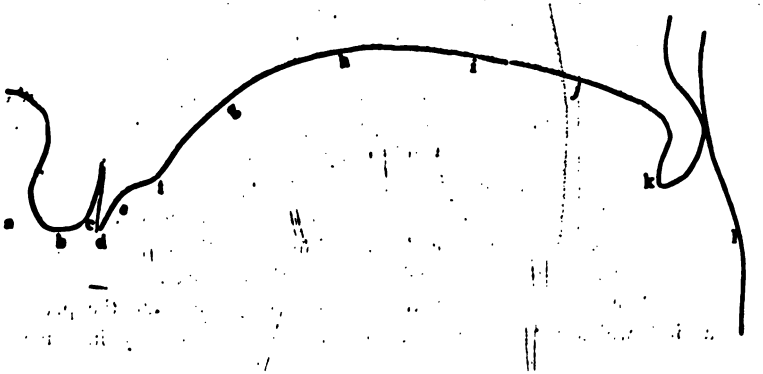
In ϑ and ε no exponents are required to indicate the place against which these organs articulate; but here we may in some

cases use numerals (or r as a substitute for a numeral, cp § 40, 41) to indicate secondary articulations simultaneous with the primary ones. Thus the sign for uvular trill is 0_r, where 0 means that the velum shuts off the nose-passage, while the trilling of the uvula indicated by r takes place. It will be seen that this device is really a means of avoiding another line (another Greek letter) for the uvula; to carry out the system with logical consistency would here needlessly encumber it. The same remark applies to the case in ε. It would be highly inconvenient to have one line for the epiglottis and another for the spurious vocal chords; but still we must provide means of expressing the movements of these organs for the very rare cases in which they are of importance, and this is done most easily by a number-exponent joined to the main cipher by which the glottis state is expressed. Thus $ε^2 1$ means consonantal friction (2) effected by the epiglottis, while the vocal chords vibrate (ε 1 = voice), and similarly $ε 1^2$ means voiced (ε 1) friction (2) effected by the spurious vocal chords.

In like manner the jaw-angle or aperture between the teeth (cf § 15) may be indicated by joining a secondary numeral to the primary one in the line α, so that, for instance, $α\ 3^b{}_3$ means that while the lip aperture is 3, the teeth are more removed from each other than usual, $α\ 3^b$ being equivalent to: lip aperture 3 and corresponding teeth aperture.

§. 20. Latin Letters.

The Latin Letters are used as exponents to indicate the place against which the movable organ articulates (*Artikulationsstelle*); their value will be seen from the diagram:



The three first positions, viz:

a = the outer lip-position (lips pouted),

b = the middle lip-position (lips neutral),

c = the inner lip-position (lips retracted),

are, perhaps, most easily distinguished by regarding the corners of the mouth from the side; in *c* these are near the second or third molar tooth; in *b* near the canine-tooth, while a line drawn between the corners of the mouth in the position *a* would pass just outside of the incisors.

d = 'interdental'

e = 'dental' or 'postdental', etc.

The following places of articulation will be better understood from the drawing, and from the manner in which the letters are used in the special part, than from any 'translation' of them into the usual terminologies of phoneticians. Those who wish to compare my division of the 'palate' with that of other authors, are referred to the alphabetical list in the Appendix.

§. 21. Doubling a letter, or printing it in a thick type, means a wider place of articulation than usual, when, for instance, the tongue touches, not a single spot of the palate, but a whole region; thus $\gamma 0^{gg}$. When two separate points have to be indicated simultaneously, the two letters must have a comma between them, thus $\gamma 0^{g,g}$; $\gamma 0^{g,i}$ would more conveniently be written $\gamma 0^{g}_{i}$, as here the two different parts of the tongue generally called the 'front' and the 'back' come into play.

§. 22. Numerals.

The numerals serve to indicate the distance between the articulating organ and the corresponding part of the mouth; the Arabic ones denote distance in the middle of the mouth (central articulation), while the Roman numerals signify distance on each side of a central closure (lateral, 'divided', articulation).

But, as we are not able to measure this distance with anything like mathematical precision, the value attributed to 1, 2, etc. must necessarily be conventional and to a certain extent arbitrary, so that we cannot say, for instance, that 3 indicates a distance exactly three times as much as 1, or that 8 bears the same relation to 4 as 4 to 2 or as 2 to 1. This is, however, the ideal standard to which

we must try to come as near as possible. But with our present knowledge the only way is to determine the value of each symbol mainly by examining the various degrees of approximation actually employed in languages to express distinct sounds. In doing so it will be well first to deal with the lines α, β, and γ jointly, and then separately with δ, ε, and ζ, each of which presents peculiarities of its own.

Values of the Numerals in α, β and γ.

§. 23. Shut and open consonants.

There can be no doubt whatever as to the value of 0; it can only mean no distance, that is to say, perfect closure, so as to hinder any escape of air. But as soon as we have to deal with such positions of the organs as allow air to escape, difficulties arise.

In order to symbolize conveniently the 'open' consonants (fricatives, spirants) I have found it necessary to subdivide them into two classes, 1 and 2. The difference is most marked in the case of the consonants formed by the anterior part of the tongue. This very flexible organ is sometimes shaped so as to form an extremely narrow friction channel, a chink or a fissure, producing a sharp hissing sound, while in other cases the aperture is more flat and broad. This distinction, which is not always made by phoneticians and which is totally disregarded by Bell and his school, is found most clearly expressed by Lyttkens and Wulff (*Svenska Språkets Ljudlära* § 270, p. 108); I only disagree with them in believing that in the group represented by [s] and [š] and called 'concave' by them less breath escapes and the aperture is smaller than in forming 'convex' sounds such as [f], [þ] and [j], and consequently I use 1 as symbol for the former and 2 for the latter group.[1]

§. 24. Thin and broad vowels.

A similar distinction may be made with regard to vowels as well; it is pretty nearly, though not exactly, the distinction made between 'narrow' and 'wide' in Bell's and his followers' works.

[1] Whitney divides the 'fricatives' into 'sibilants and spirants'; Evans speaks of 'sibilant continuants as opposed to simple continuants'. — For examples illustrating the use of 1, 2, and also the other numerals, see the detailed list of sounds; here I only give the general features of the system.

If we compare the initial sounds of French *il* and English *ill*, we find that in the latter the furrow is a little deeper, than in the former, but the possibility of letting out more air is mainly effected by rendering the orifice broader. As the odd number 1 served to symbolize the 'thin' stream of air escaping when [s] was pronounced, while the even number 2 stood for the 'broad' aperture between the lip and the teeth in the case of [f], so the odd number 3 may be used for the 'thin' French [i] and the even number $\frac{4}{3}$ for the 'broad' English /i/, and so on, 'thin' vowels having the symbols 3, 5, 7 and 'broad ones' 4, 6, 8. It is, however, a natural consequence of the shape of the tongue and the palate that the formation of a chink is much easier when the tongue is near the palate than elsewhere. Accordingly the distinction between 'thin' and 'broad' vowels is more dependent on a mere lowering of the tongue in the low vowels than in the high ones.[1]

§. 25. A natural arrangement of the positions indicated by Arabic numerals (except 0) will then be, not 1, 2, 3, 4, etc., under each other or after each other, but rather something like this:

$^{1}/_{2}$ — open consonants ($^{\text{thin}}/_{\text{broad}}$)
$^{3}/_{4}$ — high vowels ($^{\text{thin}}/_{\text{broad}}$)
$^{5}/_{6}$ — mid vowels ($^{\text{thin}}/_{\text{broad}}$)
$^{7}/_{8}$ — low vowels ($^{\text{thin}}/_{\text{broad}}$), to which may be added
9 — the widest possible aperture, as in yawning.

This arrangement illustrates, better than any chess-board scheme, the inner relations between 3 - 5—7 on one hand, and 4—6—8 on the other; and it shows at a glance that the 'high-broad' position stands, *in a manner*, between the 'high-thin' and the 'mid-thin' ones. This accounts for the fact (expressed by Mr. Sweet, but not evident from his tabulation), „that such pairs as *(i)* and (e), *(u)* and (o), are as near in sound as (i) and *(i)*, (u) and *(u)*, which differ only in narrowness and wideness". (*Hb.*, § 58).

§. 26. Lip rounding.

This distinction between thin and broad vowels is founded on the tongue positions and does not apply to the lip positions for

[1] Note also the following parallelism: as the difference between 'thin' and 'broad' is more strongly marked in the high than in the low vowels, so the proportional distance is greater between the arithmetical values of 3 and 4 than between 7 and 8.

the different vowels. And yet, if we compare the lip position for [i] with that for [u], it cannot escape our attention that there is a certain analogy with the difference indicated above by even and odd numbers. In the [i] position the lips nowhere touch each other; the opening therefore is flatter and broader than in the case of [u], where the lips are brought close together in the corners of mouth, while in the middle the distance suddenly gets comparatively much greater. It is this manner of action that constitutes the oval shape of the aperture generally termed 'round', and the similitude between it and the formation of [s] and the 'thin i' by a central channel bordered by lateral closures is certainly great enough to authorize the use of the odd numbers 3 - 5—7 in the line *a* to indicate 'rounded lips'. These numbers, in connection which the letters placed as exponents to symbolize protruding or retraction of the lips, suffice in my view to provide signs for any form and degree of lip-rounding possible; and the even numbers 4—6—8 are, consequently, symbols for not rounded lips. — Compare also in the consonants the difference between English *w* (*a* 1) and the German bilabial *v* [Sweet's bh] (*a* 2) described by Mr. Ellis as 'Lips round' and 'Lips flat' *Pronunciation for Singers*, p. 17 and p. 65; below, § 101).

§. 27. Where to measure the distance.

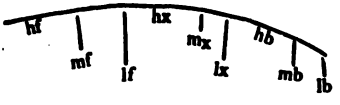
There is still one question of a general character on which I shall have to dwell at some length, as otherwise my symbols would be liable to many misunderstandings, and as it will give me an opportunity of defining my position to the question of the best arrangement of the vowels. The meaning of a group of signs as, for instance, $y5^{j}$, might differ considerably according to the different points of view, even if the meanings of the single signs *y*, 5, and j, were quite settled; and I therefore wish the reader constantly to bear in mind, that as I use the symbols, the distance is measured, not from the highest part of the tongue, absolutely speaking, but from *that part of the tongue which is nearest to the palate.* In consequence of the arched shape of the palate, these two parts do not always coincide, as will be seen at a glance in any diagram of the mouth-position for such a vowel as [a]. But it is, nevertheless, a point that has not received sufficient attention from those who have taken part in the vowel controversy, and much of what has been said about

the 'middle' position of the [a] ('das mittlere a') seems to fall to the ground as arguments against Bell's vowel-scale, when this distinction is properly made. When I pronounce this 'normal' [a], the highest part of my tongue is certainly the middle part, lying under the spot marked h, but as the distance between the palate and the tongue is smaller further back, and as it is the narrowest passage for the air that is the most active in modifying the sound, I do not hesitate to classify this sound as a 'back' vowel. This view will also enable us to account easily for the readiness with which [a] passes into the [æ] sounds, as in Copenhagen pronunciation of the long *a* and in the received English pronunciation of *hat*[1] etc. If the raising of the middle part of the tongue is exaggerated a little, that is to say, if still more of the muscular bulk is moved forward, the result will be that on the one hand the distance between the back of the tongue and the back of the palate is increased, and on the other the passage is narrowed in the anterior part of the mouth : this passage now becomes the prominent one, and the vowel no more belongs to the back-class. — The formations of many vowels would be best represented by indicating the distance at two different points, both where the tongue is nearest and where it is highest; and our system affords the means of doing so by writing for instance $\gamma\ 7^{9h}_{j}$ where 7^{j} indicates the primary or essential narrowing of the air-passage and 9h (9^{h}) the secondary raising of the tongue. But only in very few cases will it be found necessary to mark expressly the secondary degrees of opening, as they will generally be self-evident from the other signs indicative of the tongue-position in the lines β and γ.

§. 28. One of the commonest objections to the Visible Speech vowel arrangement is directed against its supposed rectilinear character. Thus, in accord with several German critics, Mr. Evans says in his *Spelling Experimenter*, vol. II, p. 57, "that in the formation of simple vowel-sounds we cannot recognise any such conditions as perpendiculary parallel heights of the tongue, involving perpendicularly parallel linguo-palatal apertures of different dimensions. We find, that if we pronounce in succession the three initial vowels of French *il, été* and English *area*, we feel a gradual recession",

[1] For the difference between these two sounds, cf. § 129.

etc. Although this objection is to a certain extent justified, or at any rate rendered intelligible, by the constant use of such terms as 'vertical' as opposed to 'horizontal' movements of the tongue, and by the chess-board arrangement of the vowel-scheme, it certainly should not be urged against Mr. Bell and Mr. Sweet, both of whom have expressly said exactly the same thing. Thus in the Inaugural Edition of *Visible Speech* we find, on p. 40, the following explanation: "From the 'low-back' to the 'high-front' position, the configurative aperture progressively advances by the nine stages lb, mb, hb, lx, mx, hx, lf, mf, hf.,[1] as illustrated in a subsequent diagram [p. 74]" — the identical arrangement which, when found in one of Mr. Ellis's works, is considered by Mr. Evans as an improvement on Mr. Bell's scheme. Tabularly arranged, the original Visible Speech system, as explained by the inventor and as shown in his diagrams,[2] would have pretty nearly the following shape:



Mr. Sweet is of the same opinion; he says (*Hdb.*, p. 211): „In passing from (i) to (e) and (æ) successively, not only is the tongue lowered, but the point of greatest narrowness is also shifted further back, the size of the resonance-chamber in the front of the mouth being thus increased in both directions"; and that this is not an after-thought, as might be inferred from the place of the remark in the Additional Notes, is most clearly shown by § 168, *Hdb.*, p. 53, where the relations of consonants to vowels are examined.

§. 29. So far from being a change introduced by Mr. Bell in his recent work on *Sounds and their Relations* or a 'concession' made

[1] In transcribing Bell's symbols, I use the following abbreviations: h = high, m = mid, l = low, b = back, x = mixed, f = front, w = wide; r = round.

[2] Bell's diagrams are, in many cases, rather inaccurate and confusing; thus the low-front vowel seems on p. 73 to be formed by complete closure, as for a palatal [k].

to Mr. Evans's system by Mr. Sweet, as Prof. Vietor says (*Elem. d. Phonetik*[2] p. 33 and § 52, Anm.), this recognition of a sloping line [i e æ] is, then, as old as Visible Speech itself or rather as old as phonetic science; see the whole series of German phoneticians, from Hellwag to Techmer, Trautmann and Vietor. But the development in modern Swedish works on sounds is particularly interesting on this point. Here Bell's system was first adopted by Lundell, but he modifies it in regarding [e] and [æ] not as front, but as mixed vowels. Noreen does so too in his papers on the Dalby and the Färö dialects (*Svenska Landsmålen* I), but in the excellent Swedish Grammar by him and Schwartz, of which unfortunately only one part has appeared, he has two classes of front (främre) vowels represented by [i] and [e], then intermediate vowels (mellan-vokaler), represented by [æ], and finally back vowels (bakre vokaler), the [a] sounds. By this arrangement he avoids the necessity of dividing the vowels according to their height, and as [i - e - æ—a] are thus arranged in a straight line, the system has acquired a certain resemblance to the old well-known triangle, and finally, in his *Altisländische und Altnorwegische Grammatik* (1884), Noreen actually returns to this triangle. At last, however, we have had a new extension in the same direction in N. Olseni's *Södra Luggudemålets Ljudlära* (*Sv. Landsmålen* VI, 4. 1887); instead of the three classes front, mixed and back, this writer makes five, and as he follows Lundell in assuming five degrees of labialisation and in discarding the difference between 'narrow' and 'wide', his vowel-scheme has room for 75 sounds.

§. 30. If we ask whether or not a similar retraction takes place in the transition from the high-back to the low-back position, we do not find the same agreement as for the front vowels; indeed we here meet with one of the chief divergencies between the Bell-Sweet system[1] and the German triangles or crosses. This divergency may be accounted for, partly by what has been said above on the different points of view (the highest or the nearest part of the tongue), and partly by the nature of the peculiar English low-back-round vowels (in *gnaw* and *not*). These seem to be more retracted than the corresponding vowels in most continental languages, and when we find an English phonetician of Mr. Evans's rank

[1] Cf. for Mr. Sweet's view on this point, the above quoted § 168.

considering [u] as formed further back than [o] and [å], the reason must probably be sought in the peculiar way, regarded by him as the normal, of forming [u], with the tongue withdrawn to an extreme back position to make up for the want of lip-rounding. But the following detailed list of vowels will better than any general remarks show my position towards this question, as also towards the vexed question of the mixed vowels. It will there be seen that although I agree with the main features of Bell's and Sweet's vowel system, I do not follow it in all particulars; the mere translation of the Visible Speech alphabet into analphabetic symbols necessitates in many cases deviations and extensions. Here I need only add some remarks on the distinction between 'narrow', or, as Mr. Bell says, 'primary', and 'wide' vowels.

§. 31. Tense and lax vowels.

One side of this difficult question has been treated above (§ 24), where two sorts of vowels were distinguished and symbolized by odd and even numerals. These 'broad' vowels are so distinct from their 'thin' correspondents that those phoneticians who entirely reject the conception of 'wideness' place them midway between [i] and [e], etc.; but there is still another variety of 'wide i' bearing a closer resemblance to the 'narrow i' than the broad English short *i* in *ill* and differing from the 'narrow i' only in being formed with less tension of the tongue muscles, while on the other hand it is kept apart from the 'broad i' by having the tongue nearer the palate and by a less flattened shape of the air-passage. We call this the 'lax' i and indicate it by italicizing *3*; when the tenseness of the 'narrow i' is very marked, we can use thicker ('Clarendon') types (3, 5, 7), reserving thus the common types (3, etc.) to be used, where the degree of tension for the vowel in question is doubtful, and — by those who do not accept the distinction at all.

§ 32. This subdividing of the narrows and wides into two classes (thin-broad and tense-lax) is partly suggested by the following passages from Mr. Sweet's works:

"It must be noted that the E. *(i)* is slightly lower than in the other languages, verging towards *(e)*". (Hb. § 76). — "The North German *(u)* in 'and', 'hast', is rather closer than the English". (Ibd. § 82). — "As regards position, [Engl.] *(i)* is often lowered"

(ibd. p. 110, cf. also p. 132). — "In the Handbook of Phonetics[1] I have assumed *(i)* and *(y)* as the normal [Swedish] sounds, on the strength of an individual pronunciation, although even in this one I seemed occasionally to hear the narrow sounds also. It must be remembered that *there are various degrees of narrowing*[2] *possible.*" (Spoken Swedish, p. 463).[3] Note also Storm's remark (Engl. Philol. p. 73), that in passing from the *ø* in Norwegean *sød* (mfnr) to the open *ø* in *sødt* (mfwr) the tongue is not only relaxed, but also lowered as in passing from *e* to *æ*.

§ 33. Techmer also discrimenates various degrees of 'imperfection', as he calls it: while in French the short vowels are as well articulated as the long, they are somewhat imperfectly articulated in Danish, more so in German and still more so in English. (*Internat. Zeitschr*, I, 179). But he is hardly right in seeing the cause of the relaxation in the quantity of the vowel ('too short' is his expression), as many languages, French and Danish for instance, have very short vowels with no trace of relaxation. Here Franke seems to have hit the right nail on the head in bringing this question into connection with the different ways of finishing the syllable. He thinks that what Sievers calls 'the strongly cut accent' in the first syllable of German and English *bitter* has been developed together with the 'wide' vowel: the 'narrow' vowel requires more energy, but as the glide and the following consonant have to be pronounced with greater energy (than in 'the weakly cut accent'), the vowel is apt to lose in energy, that is to say, is 'widened'. This, he concludes, is the reason why all short vowels in German stress-syllables are wide, and all long vowels narrow, while in the Romance and Slavonic languages strongly cut accents and wide vowels are unknown. (*Engl. Studien* VIII. 335).

§ 34. At first I was somewhat sceptical with regard to this theory, but later I became convinced of its truth, although it is perhaps stated a little too generally; and what brought about this change of opinion was a better analysis of my Danish vowels oc-

[1] „[Swedish] *(i)* and *(y)* are very close, so that they are very like (i) and (y)." [*Hdb.* p. 135].

[2] Sweet here considers the 'wide' as the normal vowels, while in other passages he seems to take the opposite and more generally adopted view.

[3] Cf now also *History of English Sounds*, 1888. § 5.

casioned by an examination of Danish sentence stress. In combinations of a verb with an adverb (as well as in other cases) the qualifying adverb receives the stronger stress, the verb itself having at best a secondary stress. This affects the quantity of the sound in the verb, where a long sound (vowel or consonant) is shortened, and the 'stød' (glottal catch, ɛ0), if there is any, disappears, but the *quality* of the vowel remains the same. Thus, for instance, the infinitive *læse* 'read' by itself is [læ.sə] with a long vowel, and the corresponding present tense is [læ,sər], where the comma stands for the 'stød'; but in the combination *læse op* or *læse højt* ('read aloud') the vowel is short, and in *han læser op* ('he reads aloud') the 'stød' is lost. If now we compare this short [æ] with the short [æ] in *læsse* 'load', which is unchanged in the unaccented *læsse om* 'reload', we find this difference, that in the first word with its weakly cut accent the vowel is tense, in the other word with its strongly cut accent the vowel is lax and sounds opener. It should be noticed that the accentuation has the opposite influence on the consonant following the vowel, and that the same relations are kept up even where, under the influence of other stress laws, the verb becomes nearly full stress, as when it precedes an unaccented pronoun like *det* ('it'), so that the two sentences *han læser det op* and *han læser det om* are pronounced [-han læsər -de ˑɔp] and [-han læsər -de ˑɔm,] respectively.

§ 35. The same remarks apply to the mid front vowel as well. All the leading Danish phoneticians have constantly looked upon the sound written *i* in *fik, finde* as the short of the *e* in *se, hvede,* etc., and as identical with the short sound written *e* in *et, hedt,* etc. Sweet heard the vowel in the first words as identical with the E. high-front-wide vowel in *bit* and therefore separated it from the vowel in the other words, which he analysed as mid-front-narrow raised. In the first identification he is not far wrong; at least I think I have heard some Danish speakers pronounce the vowel exactly as the English sound, although in my own pronounciation the Danish is decidedly different from the English sound[1]; but I do not think it possible that any of my countrymen keep the sound in *fik, finde* distinct from that in *et, hedt,* etc. The word given

[1] Two Englishmen, to whom I pronounced Dan. *liden* [li'en 'the lace'], heard it, not as E. *listen*, but as E. *linen*.

by Sweet (*Hb.* p. 162) as key-word for the short (e¹) sound: *kende* 'her' is certainly pronounced exactly as *kinde* 'membrane', and *fedt* 'grease' is sometimes written *fidt* without any change in the pronunciation; it always rhymes with *hedt* 'hot' and *lidt* 'little'. But this short vowel is not exactly the same as the shortened form of the long [e.], as it is found for instance in both *let ud* (*leet ud*) 'ridiculed' and *ledt ud* 'conducted outside'. As above we have in the former case the strongly cut, in the latter the weakly cut accent, hence the lax vowel in *lidt*, the tense one in *le(e)t ud*; compare also the first vowels in *indfatter* (lax) and *en fatter* (tense), *en Diana*, *Indianer*. The distinction is delicate, but I believe real, and applies to the corresponding round vowels as well, as for instance in *lyst* 'inclination' and *løst op* 'untied', *køler af* 'cools' and *skyller af* 'rinses'. I am even inclined to think that we have the same distinction with regard to the high vowels, although it is still more difficult to hear the difference there; but it certainly seems to me that the [i] in *lidt* 'suffered', *ilde* 'badly', etc., is not the clear sound in *lide* 'suffer', *hvile* 'rest' or in French *quitte*, *il*.

§ 86. If this view is correct, we can put it down as a general law that in Danish strongly cut syllables and lax vowels go together, and similarly it seems to hold true that in the English strongly cut syllables we always find broad vowels, the influence of the syllable-building being stronger in the latter language than in the former (4, not 3, etc.). There is only one instance in which this does not agree with the analysis of the English phoneticians, and that is the 'short *u*' in *but* [bʌt], which is regarded by Bell and Sweet as the narrow of the *a* in *father* [fa.ðə]. The want of high-back-unrounded vowels in the best known languages makes the true analysis of these sounds extremely difficult, and the best way of examining their relation seems to be that of starting from the round vowels and unrounding them — a process which is by no means easy and in which the tongue is apt to accommodate itself to preconceived ideas as to what will be the result. If, however, I try — impartially — to unround such a syllable as German *gott* or Norwegian *godt*, where according to all good authorities the vowel is mid-back-round-wide, I do not get the [a]-sound in German *hat*, but decidedly [ʌ] as in English *gutter*. If we call this [ʌ] mid-back-unround-wide (broad, 6), we at once establish the parallelism one should expect between the

vowels in *bit* — *bet* — *bat* — *but* — *foot* — *hot*, and the [a.] in *father* finds a very natural place as a *low-narrow* vowel. This transposition retains very nearly the same relation between the two vowels as that observed by Bell and Sweet (mid-narrow : mid-wide :: mid-wide : low-narrow; 5 : 6 :: 6 : 7), and it enables us to discard the incongruity felt as such by some phoneticians that the French language, where the narrowness of the vowels is generally so marked, has the two 'wide' vowels in *patte* and *pâte*. The correctness of this transposition is also rendered more probable from the fact of its having been made independently by at least two phoneticians [1] besides myself.

[§. 37. According to Bell and Ellis the difference between 'narrow' ['primary'] and 'wide' is due to muscular action *behind* the place of greatest approximation; see for instance *V. S.* p. 40 'the voice channel from the throat to the configurative aperture is expanded' and *Pron. f. Singers* p. 20 'throat wide, that is, with the larynx lower and the pharynx opener'. This was also Mr. Sweet's view, until he "noticed that the sense of pharyngal and palatal tension was always concentrated on that part of the mouth where the sound was formed, in front sounds on the hard palate. This was a reductio ad absurdum, showing that the feeling was really imaginary". (*Hb.* p. 9—10). Of course, there can be no feeling of the tension of the muscles of the hard palate, since these muscles do not exist, but the nerves of the hard palate can and do receive the impression of the more or less energetic manner in which the tongue touches the sides of the palate (and it does touch it except in the case of the lowest vowels), just as we can feel different degrees of pressure when a lead pencil is brought into contact with the hard palate. Finally, in his paper on *Sound Notation* (p. 200, cf. also Storm, *E. Ph.* p. 431), Mr. Sweet holds that whereas for the front vowels the distinction of narrow and wide depends exclusively on the shape of the tongue, the narrowness of back vowels is produced by tension and consequent advancement of the soft palate, whose action in the back of the mouth is thus parallel to that of the tongue in front. — As the back of the tongue is not so flexible as the front, and as the range of possible lowering of the tongue is smaller than in the

[1] Franke (posthumous papers) and H. Möller (lectures at Copenhagen 1885).

anterior part of the mouth, I think it highly probable that the soft palate assists the tongue in producing the different shapes of aperture necessary to render the vowels distinct; but special signs for this action need not be procured, as the numerals are meant to indicate the shape and the size of the air-passage, no matter how it is made. In a similar way the manner in which the tongue and the palate meet in forming a retracted [ɳ] is not the same as in forming [g]: the tongue is not so much raised and the soft palate is lowered so as to meet it half-way; but the symbol 0 will be quite sufficient in both cases, the essential point being that the air meets an absolute hindrance, and the difference being clear from the different symbols in the δ-line (3 and 0). In passing from [ɳ] to [g], as in E. *longer*, not only the soft palate is raised, but the tongue follows it, and yet this movement is not indicated expressly, as the 0-position is kept all the time].

Tense and lax consonants.

§. 38. As thick types are thus used to symbolize energetic articulation and italics to denote relaxation, these typographical devices may also be utilized to indicate a similar distinction in the consonants, viz. that between 'tenuis' and 'media', but of course only in so far as the energy of the muscular action on that particular spot is concerned. The difference made between the normal [t] as voiceless and the normal [d] as voiced has, of course, to be duly registered in the ε-line; and if there be a difference between the expiratory strength necessary for [t] and that for [d], as some authors seem to suppose,[1] it must be indicated in the ζ-line. In the β-line, again, everything concerning the articulation of the tongue point finds its right place; and as there is certainly a stronger feeling of tenseness in the muscles of the tongue point when [t] is pronounced than for [d],[2] 0 seems no inadequate symbol for the „fortis" or „tenuis" and *o* for the „lenis" or „media". But it need scarcely be said that the parallelism between this distinction and that between 'narrow' and 'wide' must not be taken too

[1] Sievers confounds expiratory strength (ζ) and muscular tension (in e, etc.) when he speaks of intensity. *Phonetik* § 9.

[2] This is also the view of Thausing and Flodström.

literally; and besides, here as above, the system is elastic enough to tolerate heterodox opinions, the sign 0 being quite neutral in itself.

In such a consonant as [s] tense and lax varieties can also be observed, formed with different depths of the central channel. "In English the hisses are generally wide [lax], in French narrow [tense]. Narrow (s) may be heard in energetic hissing, wide (sh) in gentle hushing". (Sweet, *Hdb.* § 25).

Side consonants.

§. 89. A similar distinction as that between open consonants of the class 1 and those of the class 2 (§ 23) is applicable to the divided ('side') consonants, and we therefore use i to denote such *l*-sounds as are formed with very strong friction; in fact the voiceless varieties of these consonants are so like the *s*-sounds that they are, occasionally misheard for them, and in some Swedish and Norwegian dialects the combination *sl* is replaced by a voiceless *l* followed by the corresponding voiced consonant (Lundell, *Landsmålsalf.* p. 19, Storm, *Norvegia* I p. 91). The sign ii then is reserved for *l*-sounds where no friction is appreciable, at least in the voiced forms, while iii and iv, etc. represent divided sounds with so wide apertures that they are properly considered as divided vowels ('vokale mit spitzenberührung'). — A separate sign must be provided for one particular class of positions resembling strongly the *l*-positions, but differing from them in not having the firm middle contact essential to the divideds; they are here written I, Ii, etc. While in the elements symbolized 1 and 2 the opening is widest in the central line of the mouth, the sides of the tongue touching the palate[1], the reverse is the case with the I-sounds. Here, the aperture is smallest in the middle line of the mouth and widened on each side of this point of greatest approximation. The Swedish and Norwegian 'thick *l*' belongs to this class (*ɖ* $l^{\cdot}$, see § 93). — Finally, ¡ is used for 'unilateral' *l*.

[1] This is, of course, more obvious in the 1-sounds than in the 2-sounds, but stomatoscopic figures show that it holds true for most of the 2-sounds and, indeed, for the high and mid vowels as well.

§. 40. Trills.

The characteristic feature of these sounds is the want of a fixed configuration. The acting organ is in a very rapid vibration back wards and forwards, and the exactest manner of writing a trill would, accordingly, be a series of signs denoting the extreme positions between which it swings. Thus the point-trill, or rather one variation of the point-trills, might be written $\beta\ 2^{fg}\ 1^{f}\ 2^{fg}\ 1^{f}\ 2^{fg}1 \ldots .$, but as this would be very cumbrous and would suggest rather a series of separate positions, each held for an appreciable time, than the rapid fluttering through many positions in the time usually occupied by one positional element, it will be the best plan simply to use the well-known letter r as sign for „trilling". — This r is regarded in every respect as a numeral, and the same modifications are applicable to *r* as to any other sign. Thus, $<$ r (§ 17) may be used for a trill that is closer than usual, in which accordingly the *0*-position is reached or is nearly reached, while conversely $>$ r means a more loosely formed trill; perhaps ɾ and *ɾ* might be used do denote various degrees of the force with which the trilling is effected.

§. 41. Letters instead of numerals in *β*.

In one more case we may use a letter instead of a numeral, viz in the line *β*. When the point of the tongue is not removed from the bottom of the mouth, as is often the case during the formation of vowels and of some consonants, it would be neither easy nor necessary to indicate exactly its distance from the roof of the mouth. But, on the other hand, it is in many of these cases of great importance to know if the tip of the tongue is resting immediately behind the front teeth or is retracted, and this can easily be indicated by writing only the letter for that part of the upper mouth, which is directly above the tip of the tongue. *β*d, then, is equivalent to : tip of the tongue resting just behind the edges of the lower front teeth; *β*e : tongue still touching the teeth, but a little further back and lower than *β*d; *β*f: tongue somewhat retracted from the teeth, but not at all raised, and so on.

[1] Instead of 1 it would be correcter to write > 0; complete closure (0) scarcely ever forms part of a trill.

Use of the Numerals in the lines δ, ε, ζ.

§. 42. We can now proceed to the values of the numerals in the sections below γ, as the articulations of the velum palati, of the glottis, and of the respiratory organs are so different from those of the upper organs as to render separate values of the symbols necessary.

In δ, in the first place, 0 signifies perfect closure so that no air escapes through the nostrils; $\delta 0$ is, consequently, a common feature in all purely oral sounds. — δ 1 produces the effect commonly known as 'nasal twang' and is less to be considered as an element of normal speech than as an individual fault, except, perhaps, in America. — δ 2 seems to be the commonest way of nasalizing vowels; it is familiar to me from Danish dialects, and the Middle (and South) German nasal vowels, as pronounced to me by Prof. Vietor, had the same degree of nasalization, which I have also heard in Portuguese (cf. Sweet, *Spoken Port.* p. 4, nr. 6). This I take also to be the degree of nasalization usually employed in the consonants [m, n], etc. — The French nasalized vowels, on the contrary, are of a different order. Their peculiarity was accounted for by Bell as due to 'guttural contraction'. There is abundant proof to show that by 'guttural' Bell meant (at least in this connection) „in the throat" (ε); he speaks expressly of "a gliding semi-consonant effect in the throat as well as nasal modification"; the sign for French nasality is a compound of the sign for nasality and of that for the contraction of the super-glottal passage, by which is created "the non-sonorous rustling or friction which is called whisper [or rather 'wheeze', according to Sweet, *S. N.* 190], and which is described elsewhere (*Vis. Sp.*, p. 39) as "the throat passage contracted;" and finally, on p. 45, where the French nasals are called nasal-mixed, the expression 'the throat contracted' is used. In spite of all this, everybody seems to have taken 'guttural' in its second sense as implying an action of the back of the tongue (γ) against the soft palate, see Storm, *Eng. Ph.* p. 36, Sievers, *Phonetik*[2] p. 81 [3]p. 101, Vietor, *El. d. Phon.*[2] p. 102. And curious enough, in this one instance the wretched ambiguity of a phonetic term seems to have put the investigators on the right scent, for the characteristic feature of these nasal vowels is really the short distance between the tongue and the soft palate; but, as this 'guttural contraction' is not effected by raising the tongue, but by "further lowering of the uvula [and

velum]" (Sweet, *Hdb.* p. 211, *S. N.* p. 190), it is written here ∂ 3.[1] — ∂ r, that is vibration of the whole soft palate, is hardly employed in any language; it may be heard in the grunting sound of dissatisfaction and in imitation of the language of swine. Produced under inspiration, it is a common variety of snorting. The uvular trill must be written ∂0r (§. 19).

§. 43. We next come to ɛ. Here, also, the 0 is simple and offers no difficulty ('the glottal catch'.) — ɛ 1 is the symbol for voice; it is true that this symbol is physiologically exact only for the 'head' register, while the 'chest' register of the voice is produced by alternately closing the glottis and forcing it open, so that the proper sign for it would be 010101[2] As, however, the moments of closure are so very short and comparatively insignificant, no harm is done by using ɛ 1 as equivalent for 'voice' of any description. — Whenever a distinction between the two registers is necessary, it can be indicated by

1 = 'chest' voice ('thick register') and

1 = 'head' voice ('thin register').

The 'glottal fricative' is ɛ 2 : the vocal chords are here approached to each other and produce the frictional sound heard in [h] (Cf. § 109—111). — ɛ 3 = 'breath' or generally 'voicelessness'.[3]

§. 44. With regard to 'whisper' authors disagree; Grützner's drawing (Hermann's *Handbuch d. Physiologie* I b, p. 122) would, translated into our figures, be ɛ I as implying close approach in the middle and greater distance on both sides, but this seems to be an abnormal manner of whispering, while normally the chord glottis is entirely closed, the cartilage glottis forming a triangular opening (Sweet, *Hb.* §. 12; Techmer, *Zeitschr.* I p. 128 and diagram nr. 6 on table II). This might be symbolized i (unilateral, §. 39). But

[1] Evans (*Spelling Exp.* II, p. 73) distinguishes three degrees of nasality, exemplified in Polish — Hindustani and Portuguese — French. I cannot say anything about the Polish nasalized vowels, as I have never heard them; cf. also Storm, *E. Ph.* p. 36 on dental and labial varieties; does here the shutting of ∂o follow a moment after that of βo and ωo instead of being simultaneous with it as it is in Fr. *trompe, peintre*?

[2] Or, perhaps, >01>01>01 > 0 implying a very loose and not quite airtight closure, see below § 86.

[3] Compare Techmer's terminology: (1) stimmenge, (2) hauchenge, (3) blasenöffnung, (i) flüsterenge.

Techmer further remarks that by extraordinary intensity of aspiration as in the 'stage whisper' also the chords are opened a little, and we therefore think ɛi a theoretically defensible, as it certainly is a practically convenient, sign for whisper.[1] It may not be out of place to note here that much of what is called whispered in phonetic works, does not come within the category ɛ i, see § 78 (whispered mediae), § 47 (whispered vowels).

If the vocal chords are vibrating, but not so rapidly as is necessary to produce voice, the croaking noise often substituted for voice by sluggish speakers is produced ("Knarrstimme"). This is often taken to be the ordinary *r*-sound in Danish; but this view, originating in a misunderstanding of Mr. Sweet's analysis and symbol (R), is not correct, as will be shown further on (§. 107).

§. 45. When we descend from the department here called ɛ to the respiratory organs and try to symbolize their actions, we do not find anything analogous to the positions indicated by 0, 1, etc. in the upper organs. In point of fact, the only thing of importance to the phonetician is here the *force* of the expiration; but whether it is the diaphragm or any other muscle that drives the air up through the throat, is totally indifferent to him. When, therefore, the ordinary numerals are used in this section (ζ), they do not indicate distance, as in α, etc., but force or stress ('expiratory accent'). 1 is weak, 2 and 3 different degrees of middle, 4 strong, and 5 extra strong stress. In other words, 1 is used for completely unaccented syllables, 2 for syllables with weaker, 3 for syllables with stronger secondary stress; 4 represents normal full accent and 5 more than usual emphasis. The several syllables in such an English word as *parliamentary* may be fairly represented by ζ 31412; *impenetrability* by ζ 3211412, although perhaps the syllable *tra* deserves 2 rather than 1,[2] while a French *impénétrabilité* (pronounced

[1] Sweet (*HP.* § 12 and 20) and Sievers (*Grz. d. Phon.* § 4.4) mention three forms of whisper, the weak (ɛ > 1²), the medium (ɛ i) and the hoarse, also called wheeze or stage whisper; concerning the last they differ from the above quoted statement of Techmers and seem to mean ɛ i², or rather, as it can be voiced (Sweet § 20) ɛ x². — Compare also Ellis's expression (Translation of Helmholtz: Sensations of Tone, 2. ed. p. 108): the vocal chords are nicked in the middle.

[2] Cp. Sweet (*HP.* § 265), whose notation when exactly transliterated into these symbols, would be: ζ 3, > 2, 1, < 2, 4, > 1, 2.

by itself) would be ζ 3 (or 3 1/2) 232324 or perhaps sometimes ζ 3333334, and a Dane would most probably pronounce *impenetrabilitet* with ζ 2311214. The Danish word *selskabelig* 'sociable' is ζ 2412; *uselskabelig* is normally ζ 31412; but occasionally, when, for instance, a person is corrected who has misheard it as *uvenskabelig*, the second syllable may be emphasized so as to alter the accentuation of the whole word into ζ 25312.[1]

As 4, 3, 2, 1 thus represent a gradual diminishing of expiratory force, 0 is a natural sign for cessation of expiration, and the negative ciphers ÷ 1, ÷ 2,[2] etc. for in-breathing, 'inspiration', with different degrees of force.

§. 46. In ζ signs for *tone* ('musical or chromatic accent') may also find a convenient place, although strictly speaking tone, as dependent on the state of the vocal chords, ought to be registered under ε. There, however, the signs would often interfere with signs for totally different processes; besides tone like stress belongs generally not to a single sound, but to the whole syllable, and this speaks in favour of banishing the tone marks to ζ. The best signs seem to be:

ˈ for high (level) tone,
ˌ for low (level) tone,
= for middle level tone,
ˊ for high rising tone,
ˋ for high falling tone,
, for low rising tone,
\ for low falling tone.

These signs can, of course, be variously combined to denote compound tones.

Supplementary signs.

§. 47. A sign is wanted for the neutral or passive state of an organ, and „seems to answer this purpose. This sign need not always be used for exactly the same position, if only it is used to

[1] In Lyttkens & Wulff's Swedish *Aksentlära* the numerals 1, 2. 3. 4 are used much in the same may as here, only implying tone *besides* stress; what these authors write 41 (as in Swedish *Hjalmar*) corresponds to ζ 4,1ˈ (according to their view) and their 32 as in Swedish *Anna* is (almost?) equivalent to ζ 4,3ˈ

[2] I use ÷ and not — for *minus*, as the latter sign would clash with the glide symbol.

indicate that position of an organ which is the most natural accompaniment of the several positions indicated for the other organs. A single comma may be used where the neutral position is not held for a full unit of time (§. 48).

In pronouncing two such syllables as [uka], the lips will as a rule move during the pronounciation of [k] from the position necessary for [u] to that of [a]. This moving or gliding we symbolize by —. In [upa] something similar takes place if [u] is pronounced with great lip pouting; the lip closure is not stationary as in [upu] or [apa], but shifts from the place indicated by the exponent a to that of b; here, instead of a letter exponent to 0 we write — as exponent: 0^{-}.

When — is used finally, it can only mean gliding towards the position of rest; so s — in the *s* of English *heads* means: gliding from the previous state s 1 towards inactivity (s 3 or 4) while pronouncing s [z].

The sign (means gliding towards a position without reaching it, and) gliding from a position which has not been reached or which has been held only for so short a time that the ear does not catch the sound of the position itself, but only the transition from it. Both are common in diphthongs, and instances will be found in the paragraphs dealing with these combinations. Joined together they may also be used, nearly in the same sense as an ordinary parenthesis; so in the first syllable of English words as *fatigue, particular*, etc., there is certainly a motion of the vocal chords towards the position for voice, this position itself being seldom or never reached because of the rapid pronunciation of the vowel and the voicelessness of the following consonant; the s-line will, therefore, have the following aspect in the first part of these words: s 3 | (1) | 3. It will be seen that the usual description of these vowels as 'whispered' is not correct; I doubt very much if real whisper, si, ever occurs in such cases.

It may be remarked that (has some likeness in shape and also in function with < explained in § 17, as) with >.

Synthesis. Quantity.

§ 48. We have already seen (§ 17) that in describing single sounds it is the best plan to write the several elements on the same

line, thus $\alpha 3^a\ \beta g\ \gamma 3j\ \delta 0\ \varepsilon 1$ = [u], α „ $\beta 0^e\ \gamma$ „ $\delta 2\ \varepsilon 1$ = [n]. When, on the other hand, a succession of sounds has to be written down, we *might* write them in the same manner, thus $\left\{\begin{matrix}\alpha\ 3^a\ \beta g\ \gamma 3j\ \delta 0\ \varepsilon 1\\ \text{„}\ 0^e\ \text{„}\ 2\ 1\end{matrix}\right\}$ = [un], but it would be far better to assign a separate line to each of the Greek letters and write [un] in this way:

$\alpha\ 3^a$ „
$\beta\ g\ 0^e$
$\gamma\ 3j$ „
$\delta\ 0\ 2$
$\varepsilon\ 1$
$\zeta\ 4$

Here the new sign ·· has been introduced in ε to signify remaining of the organ in the position it had before; the voice continues to sound during the formation of the positions required for [n]. If this sign was written in all the lines from α to ε, it would, of course, mean that the positions of all the organs are held for the time usually occupied by two (short) sounds, in other words ·· is our symbol for *quantity*. Half of it ('a full stop') signifies remaining for half the unit of time; it is especially useful in some consonantal combinations. The difference between [kt] pronounced with an audible breath-glide between the two consonants, as in Swedish and French, and without any glide, as in English, German and Danish, is simply this: $\begin{matrix}\beta\\ \gamma\end{matrix}\left|\begin{matrix}\text{„}\\ 0\end{matrix}\right|\begin{matrix}0\\ \text{„}\end{matrix}\left|\right.$ and $\begin{matrix}\beta\\ \gamma\end{matrix}\left|\begin{matrix}\text{„}\\ 0.\end{matrix}\right|\begin{matrix}0\\ \text{„}\end{matrix}\left|\right.$, the γ-stoppage being in the latter case continued for a short time after the β-closure has begun. (Cf. Sweet, *Hb.* § 241).

By combining .. and . into and so on, any degree of quantity can be easily indicated, except that of extraordinary shortness (shorter than that of a normal short sound); this may be symbolized by printing small numerals (1 2, etc.).

§ 49. **Syllables.** In ζ the numeral indicating the expiratory force is placed below the signs for that sound, vowel or consonant, which in each particular case is the most predominant sound in a syllable and is what has been termed the bearer of the syllable accent. Thus in English *battles* = [bætlz], ζ 4 is placed below the symbols for *a* = [æ], and ζ 1 below those for *l* = [l]. By this means the number of syllables is easily rendered conspicuous, but

not so the point where one syllable is ended and the next begins. To determine this is, in many cases, a very difficult matter, but I think the distinction established by Prof. Sievers in the third edition of his *Grundzüge* (p. 188 sqq.) between two sorts of syllables, or two principles of syllabification, has greatly contributed to simplify the problem. His distinction is not, as has been wrongly supposed by Techmer (*Int. Zeits.* III, 381), identical with that between acoustic and articulatory syllables, in which case one of the categories would exceed the scope of this paper. Both divisions are, on the contary, founded on the articulations of the organs, but in one case regard is paid to the expiratory organs, to ζ, as we would say, in the other to the organs of the mouth, to α, β, γ, δ, and ε. Sievers's theory may be summarized as follows:

1. Whenever there is discontinuity of expiratory force, we have two syllables, even if the sonority of the sounds thus separated is the same (Expiration syllables.)

2. Whenever a less sonorous sound is pronounced between two more sonorous sounds, we have two syllables, even if there is no discontinuity in the expiratory force. (Sonority syllables, schallsilben).

The sonorirty (*schallfülle*) of a sound is determined by the ε-status, and by the mouth-position required for pronouncing it, the rule being that the greater the opening, the greater the sonority, A syllable division which depends only on these circumstances, has evidently not to be separately marked in the ζ-line — and it would, indeed, be impossible to decide where it should be marked in ζ, as there is no definite point where we can say: here the first syllable ends and the second begins.

But with the expiration syllables it is otherwise; here we must have a symbol for syllable division in ζ. And as two consecutive sounds are separated by a vertical stroke | continued through the lines from α down to ε, so | is placed in ζ to denote the discontinuity of force between two syllables.

A few examples will show the application of these principles: [aa] — two a's after each other in two syllables must be written

(α β γ)	7	. .	while a long [a], forming but one syllable,
ζ	4	2[1]	must be written thus:

[1] Or 3, or 1, as the case may be.

(α β γ)	7	..	
ζ	4		

, even if the final force be equal to that of the second [a] in the first case. The notation

(α β γ)	7	..	
ζ	4	2	

would be impossible as we cannot have two syllables without discontinuity in the expiration, when the mouth-position (the sound) remains the same.

A German *kanne* [kanə] or a Danish *kande* [k'anə] would be symbolized thus:

(α β γ)	o	7	o	5		Two syllables, but no break of unity
δ	o	..	2	o		in expiration.
ζ		4		1		

Swiss-German *lëse* would, according to Sievers, be:

(α β γ)	ii	5	1	5	, and similarly one may hear
ζ		4		1	

a French *va donc!* pronounced in a provoked tone with more stress on *va* than on *donc:*

(α β γ)	2	7	o	7	In both cases we have two syllables,
ζ		4		2	there being a break of expiratory

continuity as well as a diminution of sonority in passing from *e* to *s*, or from *a* to *d*. This is, of course, always the case, when the second syllable has stronger stress than the first, as in Danish, German, English, French *papa*.

Where a doubled consonant is placed between two vowels, two cases are possible; in the first, exemplified by Swedish *fatta*, the expiration divides the long consonant into two parts, each belonging to its syllable; the second is found in Italian *fatta, da casa*, if I dare trust my impressions of that language which I have only heard two or three times from natives; here the expiration divides the syllables before the beginning of the consonant.

Analphabetically:

Swedish ζ		4ˈ		(>)2ˈ	
Swedish and Ital. α β γ	1	7	o	..	7
Italian ζ		4ˈ			2

Abstract signs.

§. 50. It is often advantageous to have highly abstract signs, and I therefore use z for any Roman letter, no matter which, x

for any numeral indicating consonantal position (o, 1, 2, i, ii, and r), and y for 3 or any numeral higher than 3. Thus $\beta 0^{n}$ means any point shut consonant, dental, alveolar, or cerebral, etc., βx^{f} any 'supradental' consonant; βy^{f} = tongue point resting below f without being so near to this point as to form a consonant; γy^{n} = any front vowel, γ y = any vowel. — ζx is similarly a sign for a non-syllabic, and ζy for a syllabic sound, corresponding to Techmer's *symphon* and *phon* respectively.

Retrospect; general character of the symbols.

§. 51. We have now surveyed all the signs that I have thought it necessary to provide; I think all those physiological processes which have been described hitherto as contributing to forming speech sounds have found their symbols. But it may be objected to my system that I have used the same signs in different senses: a 3 in α means high rounding, in γ high narrow (high thin), in γ French nasality, in ε breath and in ζ half-strong stress. I answer to this that it would be quite impossible to devise symbols easy to write, to print and to remember, if we were to have a separate set of signs for each of those groups of processes which belong to the separate articulating organs. Compared, for instance, with the use of [h] as general modifier in Mr. Sweet's *Handbook*,[1] these different values of my numerals will, I hope, be found to be easily remembered and comparatively consistent; o, 1, 2, 3, and so forth, form in each department of our vocal organs a series, the meaning of whose several components is naturally determined by the nature of that organ, so that no ambiguity can arise for such persons as are tolerably familiar with the elements of phonetics. That 3 in u has a meaning different from that of 3 in γ, is no more to be found fault with than the different values ascribed to 3 in such a number as 333, where the first 3 = 300, the second = 30, and the third = 3. Nay, if the Arabic system of writing numbers is regarded as an immense progress on all previous systems, I hope this attempt to carry out a similar principle in another domain will not be looked upon as something blame-worthy.

[1] th, sh, gh, lh, ch, uh.

III.

SOUNDS.

> . . . how much better fun observing is than writing.
> Ch. Darwin, *Life & Letters* II, 341.

§. 52. In this special part of the work the symbols proposed in the previous parts will be shown in activity. An attempt has been made to analyze and describe analphabetically numerous sounds in the better known European languages; but I am fully aware of the imperfections of this attempt and hope that the reader will be indulgent, as he certainly ought to be if he takes into consideration the difficulties of the matter. As the symbols allow, so on the other hand they require greater accuracy in the analysis than do other systems, and my personal knowledge of the sounds I have to deal with is not always great enough to satisfy this requirement.

But my work would, on the other hand, be incomplete, were I to give only the means of writing down sounds without showing practically how I applied these means; and I have therefore ventured to give the following lists, hoping that those who may find fault with them, will not content themselves with merely stating their incorrectness, but will analyze and describe the sounds more correctly, by the help either of my notation or of some other that allows the same or a greater degree of exactness.

With regard to my personal study of sounds, I may state that I am, of course, most familiar with the sounds of my own mother tongue Danish; English and French pronunciations I have studied first at home and then in those countries; the same can be said with regard to German, though to a smaller extent, as other pursuits hindered me from paying full attention to pronunciation during my five months' stay in North Germany, and as I was, moreover, somewhat confused by the puzzling want of a standard speech. Norwegian and Swedish I have heard very often at home and abroad; Icelandic, Færoic, Russian and Dutch pronunciations I have studied with natives without, however, being able to speak these languages. I never speak of a sound without having heard it repeatedly by natives, except in very few cases where it is clearly pointed out in the context that I have had to rely on statements made by others.

Of course my debt to the current phonetic literature is very great; I must here specially name the works of that indefatigable observer of living speech, Henry Sweet. I reckon it as one of the greatest fortunes of my life that I have been able to attend to his phonetic lectures at Oxford (1887) and to discuss phonetic subjects with him personally. I have also been in personal connection for longer or shorter time with most of the eminent phoneticians of several countries and to some of them I owe extremely much. I feel impelled here to name with thankfulness one man, Professor Vilhelm Thomsen of Copenhagen, as it is not generally known how much he has done for the phonetic science by his excellent public teaching, and by his never failing readiness to support and promote the works of the younger phoneticians among his countrymen.

0.

§. 53. The symbol 0 is the natural sign for absence of aperture, that is to say for perfect closure. If we have such a closure in the larynx (ε0), the air is completely hindered from escaping, and consequently no air-vibrations, no 'sound' in the ordinary sense of the word can be formed. A similar effect can, in the upper organs, only be produced, if we have two simultaneous closures, one of which must be that of the nasal cavity by δ0. Then, as in the case of ε0, a 'pause' is the necessary consequence of the positions of the organs[1], and those authors seem to be right who think that this pause is the essential feature of the shut consonants, and that they cannot therefore be termed sounds, unless we give such a definition of this word as to include in it the numerous sound-less moments occurring in ordinary speech.

But, on the other hand, we must not treat as identical these pauses and other pauses. If during the closure described above the expiratory organs continue their activity — if, in our figurative

[1] Here are left out of account two possibilities for sound-formation in such a status of the organs: first, by smacking with the lips or by any other click-forming action, in which out-breathed air is not required, and secondly, by letting the vocal chords vibrate so energetically that the sound of the voice penetrates through the soft parts forming the closure; this is what the Germans call the *Mitlaut* of a fully voiced [b], etc.

language, ζ is a positive number — the air is compressed behind the closure in such a manner as to make the action of opening a sort of explosion, quite otherwise audible than the opening would have been, if we had had $\zeta 0$. If, therefore, during the pronunciation of the shut consonant, there is a pause, there is not cessation of sound-formation, and it is only because it is thus a sound-preparing pause, that it can be used as an element of speech.

§. 54. $\alpha 0$ is the common articulation of the three ordinary consonants [p, b, m] and of the fourth comparatively rare */m/* (voiceless m). For the difference between [p] and [b] see § 38, 76 for that between these two and the two m-sounds see §. 42, 73. Here we only treat of the place of formation for the α-closure.

On the whole it is of no great consequence whether $\alpha 0^a$, 0^b, or 0^c is formed; the general acoustic impression being the same, these various forms are hardly kept distinct in any language. In most languages the tendency is certainly that of pronouncing $\alpha 0$ at a, b, c according to the surrounding vowels, so that *p* and *m* in such combinations as [upu, umu] have $\alpha 0^a$ or at least $\alpha 0^{ab}$ or $\alpha 0^{bc}$, and in [ipi, imi] $\alpha 0^c$ or $\alpha 0^{bc}$. In [upi, umi] a movement of the lips may be observed during the closure, which may be written $\alpha 0^{a-c}$ or shorter $\alpha 0^-$, if a and c are the exponents preceding and following; in [umi] the whole labial process is $\alpha\ 3^a \mid 0^- \mid 4^c$ [1].

§. 55. $\alpha_d 0$, closure formed by the lower lip alone against the upper teeth, has been observed in Norwegian *m* before [f, v] (= $\alpha_d 0\ \delta 2\ \varepsilon 1$) by Brekke and Storm; in Danish, too, it is the common sound of *m* in *komfur, om forladelse,* etc., also very often of *n* in *konfirmere* and sometimes in *konvolut,* where the vulgar form is decidedly [kᵉɔmfi- lut] with $\alpha_d 0$.

The same articulation has often been observed in German *p* before *f* as in *pferd; $\alpha_d 0\ \delta 2$* is attested for many parts of Germany by Trautmann (*Sprachlaute* 1049, 1051) in combinations like *kampf, sanft, fünf.* According to Franke, however, the articulation is rather 'bi-labio-dental': the closure is formed between both lips, but in such a way that the lower lip has already a more retracted position than the upper lip, so as to facilitate the transition to the following

[1] This is, of course more conspicuous in languages with strong lip-articulations, such as French, than in English.

$\alpha_{d}2$; the same position, which in our symbols must be something like $\alpha^{b}_{d}0$, Franke also finds in the final [m] written *u* in saufen = [zaufm]. (*Phon. St.* II 37, 45).

In English, Evans considers $\alpha_{d}0$ as a very common pronunciation of *m* in *nymph, triumph, triumvir, circumvent* (Spelling Experimenter II 94); with regard to *p* in *hopeful* and *b* in *subvert* he speaks more doubtfully (ibd. 88, 91). As far as I have been able to observe these combinations, they are more generally facilitated by another means, namely by modifying *f* and *v* into $\alpha_{cd}2$, cf below §. 101.

In the French interjection [pf] the [p] and similarly [b] in *Abbeville* [abvil] is 'almost denti-labial' (Passy, *Les Sons du Fr.* §. 38): = $\alpha^{b}_{d}0$? The same phonetician finds a 'half dentolabial' [m] as a common substitute for *v* before a nasal: *je suis venu* = [šsqimny] (*Phon. St.* I, 39); as he has told me, he now considers it as a nasalized [v] = $\alpha_{d}2\ \delta 2\ \varepsilon 1$, and that is certainly the correct view.

As I have remarked in a previous paper[1], the articulation $\alpha_{d}0$ is often substituted for $\alpha 0^{b}$ by people who talk while laughing or smiling. On the whole, however, $\alpha_{d}0$ is not very common in ordinary speech, and seems never to be used as a significant element distinct from $\alpha 0^{b}$, a fact which may easily be accounted for by the almost inevitable escape of breath between the upper teeth that renders the closure and consequently the explosion less perfect.

§. 56. Various β-closures are very often used in languages, especially the inner forms, while the outer forms $\beta 0^{a}$, 0^{b}, 0^{c}, however easily formed[2], hardly occur in any language. A $\beta 0^{b}_{d}$, with simultaneous contact of the upper lip with the point and of the upper teeth with the blade of the tongue, is equally possible.

$\beta 0^{d}$ may individually be used for English *th* (cf. §. 59).

$\beta 0^{e}$, 0^{f}, 0^{g}, with their subdivisions, as $\beta 0^{ef}$, 0^{fe}, 0^{e} etc., are found in the ordinary [t, d, n, *n*] of nearly all languages. Generally there is no difference between the place, where [t], and that where [d], or that where [n] is formed, the distinction between these sounds being made in other departments (§ 73, 76 sqq.); but in

[1] *On Sound-Laws*, Nordisk tidskrift for filologi VII 237, Internat. zeitschrift für allgem. sprachw. III, 210.

[2] According to Preyer (*Seele des Kindes* 1884, 314 335) $\beta 0^{b}$ is one of the sounds most infants find pleasure in producing.

Swedish, according to Lyttkens and Wulff, [t] is $\beta 0^{e}$, [d] and [n] $\beta 0^{ed}$ except when following [t] as in *utdö*, where both consonants are formed at e.

§. 57. $\beta 0^{e}$ is found in Icelandic and Færoic pronunciation, also in French and Russian, though not so marked as in the former two languages, where $\beta 0^{ed}$ is, perhaps, the correctest notation; even $\beta 0^{d}$ seems occasionally to occur.

The usual place for this closure in Danish is just behind the teeth, which are not touched at all; but as a consequence of the shape of the gums it is generally not the point of the tongue alone which touches them, and we must therefore symbolize the sound-element as $\beta 0_{t_e}$[1]. As far as I have been able to ascertain the formation of German (North-German) [t d n], they seem to be formed exactly in the same manner as the Danish.

Passing further back we find the English [t d n], generally formed as $\beta 0^{f}$; sometimes they are real blade stops (Sweet, *Hb.* §. 146) = $\beta 0_{t}$ or $\gamma\ ^{t}0$. — In some cases the English sounds seem to be still more retracted (fg or even g), especially after a point-inverted vowel (cf. below §. 131); this seems to be the general pronunciation in America.

§. 58. $\beta 0^{f}$ (pure point) occurs in Norwegian after [r] in such words as *kort*, *barn*, when [r] is still pronounced (though without any trill, as $\beta 2^{f}$ or 2^{fs}, cf. §. 103); those who leave out the *r* altogether, seem to pronounce a more retracted sound ($\beta 0^{s}$), which is the common form in 'Upper' Swedish pronunciation of the same words.

$\beta 0^{f}$ is, according to Mr. Ellis (EEP p 1096) the now prevailing pronunciation in India of the Sanscrit 'cerebrals'; „Mr. Gupta (Mr. Ellis's authority) distinctly repudiated inversion". By inversion is here evidently meant formation by the lower edge of the point (the symbolization of which is indicated §. 19) against g. Really inverted [t d n] (= $\beta^{s}0$) occur after *r* and the thick *l*, in Swedish and Norwegian dialects, Lundell 47, Storm *Norvegia* I, 100.

I have heard $\beta 0^{s}$ (not $_{s}0$) before [r] in the south-western corner of Jutland (Darum) in words like [træ,].

[1]) Paul Passy describes his (French) [t, d, n] as $\beta 0^{\circ}_{t}$, the tip touching the teeth and the blade the gums just behind the teeth.

§. 59. Further back than g hardly any tongue-point sound is formed. We may therefore now proceed to the sounds formed with the surface of the tongue, and here we find first among the *blade*-sounds the substitute for [þ] used by English-speaking Irishmen at the beginning of a word (after a vowel they seem to pronounce the normal [þ] or at least an open consonant resembling it); the tip of the tongue is pressed against the lower teeth, while the blade forms closure with the upper teeth = βe γ ᶜθ (∂θ ε ʒ).

§. 60. γ ᵗθ is not seldom found in Danish *t* before *j* (cf. §. 71) as in *tjæne*, where, however, βθ$_{ct}$ with or without simultaneous γ^{s}ᵗ is also common. — γθ^{s} is said to be the first articulation in Italian *ci gi* and in Hungarian *gy, ty*. It is, in some parts of Sweden at least, the first element of the 'soft k' as in *kära* [ˈʀcæ.ra] and in *tjog* [ʀcɯ.g]. γθ^{s} may be heard very often in the Danish *tjha* (as some authors write it), a modification of *ja* 'yes' to express hesitation or doubt = [ʀ c a.], also [ca.]

§. 61. γ 0$_{hg}$, 0$_{h}$, 0$_{hi}$, or even 0$_{i}$ are the common types of [k] and [g] positions before different vowels. The corresponding nasal [ŋ] seems often to be formed further back than [k] or [g], but I am not sure of this. — A γ 0$_{j}$ is found in Greenlandic ĸaĸaĸ, mountain, as pronounced to me by Prof. V. Thomsen.

§. 62. ∂θ is an element of all the 'oral' sounds as opposed to the nasal ones, in which the nose-passage is more or less open (§. 42). As there is no distinction between ∂ θ and *o* and as the soft palate can only shut the nose-passage in one place, no further remarks are needed.

§. 63. εθ in so far resembles ∂θ, that no varieties can be produced by articulating at different places; but here a distinction between a stronger (εθ) and a weaker form (ε*o*) seems to exist. The former is the Danish 'stød', which serves to distinguish words as [ma,lər] '(he) paints' and [ma.lər] 'painter', both written *maler*, or [ul,n] 'the wool' and [ul.n] 'woollen', both written *ulden*. As this distinction corresponds to an older tonic difference still preserved in Swedish and Norwegian, the ˌθ is almost universally named by the inappropriate term 'stødtone'.

§. 64. The development of this stød depends on two conditions; first the word must have the original Scandinavian accent

No. 1[1] and secondly there must be a long voiced sound in it, either the vowel or the consonant following it immediately. Thus words as *gud* [guð] or *kors* [kɔrs *r* voiceless], which in Swedish and Norw. have accent No. 1, are not capable of receiving ˌ0 in Danish because of the shortness of the vowels and the following consonants. In modern Danish, however, the stød has shortened the sound, so that the vowel in [ma,lər] is not so long as that of [ma.lər], and the *l* in [ul,n] not so long as that of [ul.n][2]; nay it may be said that they have almost the same quantity as ordinary short sounds, if we only take into account that part of the sound that is *heard*. But the position of the organs is retained while the glottis is shut, during which time nothing, of course, is heard of the [a] or [l] sound[3]. In some of our dialects (Seeland), however, the quantity of the heard vowel is decidedly greater than in the Copenhagen pronunciation; and similarly when the vowel is short, the ˌ0 is heard before the consonant, while in the standard language the consonant ([l] in our example *ulden*) is heard immediately after the vowel just as where there is no stød; then the stød comes and breaks off the sound of the consonant a moment after it has appeared and in such a manner that nothing more of it is heard: the transition from [l] to [n] in [ul, n] takes place exactly at the same time as the explosion of the glottal stop. Translated into our symbols for the articulations, these acoustic differences look as follows[4]:

	Standard								*Dialectal*							
	[a, l]				[ul, n]				[a, l]				[u, ln]			
β	g	..	ii		g	ii	..	o	g	..	—	ii	g	ii	..	o
ε	1	o	1		1	..	o	1	1	..	o	1	1	o	1	..

[1]) Termed by other writers the simple (as opposed to the compound) tone, the monosyllabic (because it is found most frequently, but not exclusively, in words of one syllable), the acute, the accent-form 41 or 'Hjalmar', etc.

[2]) Jessen, *Tidsk. f. filol. og pædag.* II 56.

[3]) This is the reason, why in these cases the quality of the vowel is the same as when it is long, so [fra,], not [fr A,] (§. 129), [t r æ.] with [æ], not [ɛ] as in [t r ɛ s g o,], etc.

[4]) Only the articulations in β and ε are taken into account, as a full notation of the processes in the other lines as well would only hinder the easy survey of the subject. My 'Romic' notation is not quite sufficient for these minutiæ.

§. 65. It must be remarked also that as a consequence of the strong articulation of the ɛ0 the vocal chords are often separated so violently that the position for voice (ɛ1) is surpassed: a voiceless moment (ɛ3) then follows the ɛ0, and this, combined with the general tendency in Danish to devocalize the last sound or the latter part of the last sound before a pause, makes ɛ3 the general glottis-status for final consonants after a stød, as *l* in [sa,*l*] [1]. Also between ɛ0 and a voiceless consonant as in [ta,lt] 'spoken' *l* is generally quite voiceless.

When the stød itself is final, as in [fra,], the off-glide is voiceless and perfectly corresponding to that after a final [k] or [p]. In some dialects this is not the case: the vowel is heard distinctly after the ɛ0, so that it appears divided by the stød into two distinct parts [2]:

	Standard				*Dialectal*			
γ	7	· ·	—		γ	7	· ·	·
ɛ	1	o	3		ɛ	1	o	1

§. 66. According to Verner, the Lettic language employs ɛ0 very much in the same manner as a sense-distinguishing phonetic element as Danish; and curiously enough, it seems developed there exactly as in Danish from a previous tonic accent. — In other languages ɛ0 may be heard final after a vowel, but not used as a regular element of the language. Thus I have heard it individually in a Norwegian's pronunciation of *ja* and *nej*, and also in France, when *oui, non* or *tiens* are pronounced in a short, almost sullen way. The French language also possesses an interjection [hæ,]; I was very much astonished one fine day some two or three years ago by hearing it pronounced quite spontaneously by my friend Paul Passy, just after he had made some efforts to acquire the Danish ɛ0 after a vowel as if it were a completely new sound.

§. 67. Before vowels ɛ0 is more common, generally in the weaker form ɛo. This is the 'kehlkopfverschlusslaut' so frequent in German as an introduction to a vowel, also in the middle of a sentence, nay of a word: [ˌaino ˌandoro ˌer, inorunk]. In Danish

[1]) Jessen, l. c. 61. — In [sa,ln] *salen* or [-en sa,l -i slɔdɔd] *en sal i slottet*, only the first half, if anything, of *l* has ɛ3.

[2]) P. K. Thorsen, *Sjörsmålet*. København. 1886 §. 3, 4.

its appearance is not so regular: after a pause it is not unfrequently heard, especially before an accented open vowel (γγ: æ å ɔ a), not so often before [i] or [e], for instance. In the middle of a sentence it is hardly ever heard. In English and French initial ε0 is much less frequent still; yet Englishmen and Frenchmen seem involuntarily to drop into it when trying to pronounce a foreign word beginning with a vowel.

The Arabic Hamza is, according to Czermak, ε°0 (simultaneous closure of the glottis and of the superior issue of the larynx by the epiglottis). –

ε0 as an element of stopped consonants will be mentioned below, §. 81.

§. 68. Hitherto we have only considered the 0-elements by themselves; but while a closure is formed, for instance, by the lips (α0), it is evident that the tongue, the velum, and the vocal chords may assume various positions, thereby modifying in various ways the sound, that is the final results of the shape of all that which meets the air on its way from the lungs to the atmosphere outside of the speaking individual. It will, therefore, be necessary here to indicate the most important of these modifying actions [1].

§. 69. A 0 in β or γ is often accompanied with the α-position for the nearest vowel; thus [tu ku] with $\alpha 3^{\alpha}$, also [kw] with $\alpha 1^{\alpha}$. In many cases, however, the lips only move towards the vowel-position during the formation of the stop. — $\alpha 1^{\alpha}\beta 0$ or $\alpha 1^{\alpha}\gamma 0$ before a not-rounded vowel is, of course, possible; the latter (or $\alpha 3^{\alpha}\gamma 0$) has been supposed to be the pronunciation of Latin *qu* in *qui*, etc.

I do not know of any case of β-action modifying an α0 or γ0.

§. 70. In pronouncing [ipi ibi imi] or [upu ubu umu] there is a natural tendency to retain the γ-position for [i] or [u] during the stop; and it is not difficult to tell by the sound of [m] whether an [i] or an [u] is to follow it. In [imu], [umi], [upi], etc., the γ-position shifts backwards or forwards during the α0.

1) α0 in combination with a vowel (§. 64—67) is pronounced with the same position of α β γ δ as the vowel itself.

These modifications, which in most languages pass unnoticed, because they are always dependent on the surroundings, are developed in a peculiar way in Russian. There an older [m + ja], [m + jo], etc., is assimilated to a palatalized [m] + vowel without any [j], so that a difference is made between one [ma] with [m] = $\alpha 0^{b}\ \gamma 7_{l}\ \delta 2\ \varepsilon 1$ and another with [m] = $\alpha 0^{c}\ \gamma 3^{\varepsilon}\ \delta 2\ \varepsilon 1$ (or, if Techmer's drawing, *Intern. Zeitschr.* I, tab. IV, 12a, is correct, rather $\gamma 5^{\varepsilon}$), and in the same manner with [p, b]. — In Irish Gaelic, labial consonants seem, according to Mr. Lecky, liable to modifications not only by $\gamma 3^{\varepsilon}$, but also by $\gamma 3_{l}$ (? α_{l}).

§. 71. A γ-modification of $\beta 0$ is what is generally called palatalization or fronting, as Dr. Sweet now terms it. This must not to be confounded with palatal sounds as those mentioned in §. 60. The Russian palatalized [t'] in Fat'ma appeared to me to be $\beta 0^{ef}\ \gamma 3^{\varepsilon}$, while Sweet (*Russian Pron.*, Transact. 1877—9, p. 548) describes it as $\gamma 0^{\varepsilon f}$: "[the] place of stoppage is shifted back entirely to the outer front (Y)-position . . . the point of the tongue not being employed at all". — $\beta 0_{fe}\ \gamma 3^{\varepsilon}\ \delta 2$ is frequent in Jutlandic dialects in words like those written in normal Danish orthography *mand*, *vand* = [man',], [wan',].

French *t* in *pitié* seems in educated speech to be nearly always $\beta 0_{ef}\ \gamma 3^{\varepsilon}$ or 2^{ε}, while it becomes vulgarly $\gamma 0^{\varepsilon}$, represented in comic writings by *piquié*. The consonant being thus (almost or entirely) identical with the advanced [k] in *cinquième*, reverse spellings like *cintième* are used to represent popular pronunciation. — The voiced *d* seems in French less liable to this palatalization, while one of the forms of Fr. *gn* is $\beta 0_{ef}\ \gamma 2^{\varepsilon}\ \delta 2$ followed by $\gamma 2^{\varepsilon}$ or 3^{ε} as a glide before a vowel.

§. 72. When a palatal vowel modifies a 'back stop', the influence is generally shown in shifting the place of articulation forwards ($\gamma 0_{h}$, $0^{h\varepsilon}$, 0^{ε}); but in some cases, at least, this is not the only modification, the 'front' of the tongue being simultaneously raised to a vowel-position; thus $\gamma 0_{h}$ seems in Jutlandic words as [k'jæ.r] to be accompanied by $\gamma 3^{\varepsilon}$ ($\gamma 0^{\varepsilon}_{h}$); and perhaps this is also the articulation of the older English pronunciation of *kind*, *girl*?

§. 73. δ-modifications. The sounds formed with $\alpha\beta\gamma 0$ fall into two distinct groups according to the position of δ: [p b t d k g]

have $\delta 0$, and their peculiar position among speech-sounds[1] is a consequence of the complete barring of the air-passage (like that produced by a single stoppage in $\varepsilon 0$) — while [m n η] and the corresponding voiceless sounds have $\delta 2$ ($\delta 3$?). Generally we have nasal sounds corresponding to every variety of $\alpha\beta\gamma 0$; only for $\gamma 0$, a corresp. nasal sound cannot be formed, as the closure takes place behind the velum (Evans p. 95).

In English *open* (Sweet *Hb.* p. 213) and similarly in Danish *åbn porten* the $\alpha 0$ from the *p* or *b* is often held during the pronunciation of *n*, without, however, modifying the n-*sound*, as the air does not reach so far as the lip-closure; $\alpha 0$ $\beta 0$ $\delta 2$ is not a simultaneous [m] and [n], but an [n] with simultaneous irrelevant $\alpha 0$.

§. 74. Of hardly less importance than this δ-modification is the ι-status, while a 0 is formed above the glottis.

First let us consider those cases where $\alpha\beta\gamma 0$ is combined with $\delta 2$. Here, in all languages, the voiced forms ($\varepsilon 1$) seem much more common than the voiceless ones ($\varepsilon 3$), and this has induced many phoneticians to suppose that voiceless nasals do not occur at all. Now, however, they have been found in a great many languages.

Icelandic final *n* after *t* (written *t* or *r* : *harn*) = $\beta 0^{\iota}$ $\delta 2$ $\varepsilon 3$.

Welsh *nh* in *nhad*, as pronounced by Dr. Sweet and Prof. Rhŷs,

= β 0	—	"
γ "	—	7
δ 2	0	..
ε 3	—	1 (Cf. Sweet, *Spoken N. Welsh*, 10, 11).

The same articulation is often found in a scornful pronunciation of Danish [n h æ.] for [n æ.] 'no'. — The Icelandic initial voiceless [n], written *hn* or *kn* as in *knapp*, is different; the voice sets in just before the relaxation of the β-closure:

β 0	"	
δ 2	0	
ε —	1	

So also in Danish *n* after *k* (which is pronounced), as in *knap*, and in our pronunciation of Greek pneûma, thnēskō = [p'nȫuma· t'næ.gro,].

[1]) Cf. §. 53.

[m] = α0ᵇ ∂2 ε3 often in French *-isme*, *-asme*, although many speakers (especially in Belgium and Switzerland, it seems) pronounce [-zm]; in Paris [-s] alone, with dropped *m*, is common. — [m] with ε3 also in Swedish *rytm*, *sarkasm* (Lundell, p. 23, Lyttkens-Wulff 265); [n] ε3 occasionally in Swed. *vatten* (Lundell, p. 31). — In Swedish and Norwegian dialects the combination voiceless + voiced [ŋ] or [n] also occurs for older *kn* (Lundell 31, 71; Storm, *Norvegia*, 93).

A curious assimilation takes place in rapid Danish pronunciation of such a word as *amtmand*; instead of [mtm] is found [mpm], [mmm], and even (in my own pronunciation oftener than any of the other combinations, while others do not seem to use it) [m *m* m]; the relation between these manners of pronouncing is distinctly brought out in the analphabetic transcription:

α	0	„	0	0	..	..	0	..	..	0	..	..	0	..	..		
β	„	0	„	„	0	„	„	..	..	„	0	„	„	..	..		
∂	2	0	2	2	0	2	2	0	2	2	..	..	2	..	..		
ε	1	3	1	1	3	1	1	3	1	1	3	1	1	3	1		

The first two notations are *acoustically* identical.

§. 75. In English 0 ∂2 ε3, supposed by Bell to be pronounced in *tempt*, *tent*, *length*, is denied by Sweet. The truth seems to be transition ε1—3 or rather ε1)—(3 during the 0∂2: t e n t
ε 3 1 — 3. Cf. also Evans, p. 94.

German *n* in *schnee* has ε3 throughout according to Trautmann; but I think, in accordance with Franke, that there is rather a gliding ε3)—(1 in the opposite direction of that just mentioned.

So also in Fr. *croquemort*, *rythmique*; according to Beyer the first half of the nasal is voiceless and the second voiced, but I think it is correcter in this as in all similar cases (Eng. *try*, etc.) to assume a gliding of the vocal chords instead of a fixed limit between the two states; the voicelessness is not so marked here as in Danish *kn*.

§. 76. When ∂0 is simultaneous with a closure effected by the lips or the tongue (α β γ 0), the ε-state is very important; but it is a very difficult matter to determine it in each separate case, and although in most languages only two forms of these stopped consonants are distinguished or are felt as sense-distinguishing ('tenuis' and 'media'), the languages vary considerably as to the manner in which this discrimination is made.

If first we consider the *mediæ*, the 'soft' consonants, the easiest and purest type of these is that represented by ($\alpha\beta\gamma$) *O ɛ 1*: a less energetic closure above, accompanied by voice. This is the type prevalent for *bdg* in the Romance (and Slavonic) languages, it is used medially in English, Norwegian, Swedish, and North-German. In Danish it is said by Hoffory to occur after [l] and sometimes after [n] in such words as *fyldig, mandig* [fyldi mandi(q)], but I think the usual pronunciation of the consonant is in this position the same as everywhere else. In my own natural pronunciation of my mother-tongue I have only been able to discover a true *O J 0 ɛ 1* in one case[1]: an unaccented [ə] (§ 122) between two consonants belonging to the same organ disappears regularly, the first of the consonants assuming its syllabic function. Thus *alle* in *alle lande, alle dage, alle ni,* etc., is pronounced [all] [al.]. In *begge gange,* now, [ə] in disappearing seems nearly always to leave a trace in the voiced pronunciation of the media: instead of [*bægə gaŋə*] with 'voiceless' *g* we have [bæ(*g*)g (*g*)aŋə] with [g] = *γO ɛ 1*. Similarly in *er det det?* = [æddə] instead of [æ -*d*ə *d*ə].

§. 77. Closely resembling the *O ɛ 1* are the mediæ found in English and Norwegian initial [b d g]. Sweet's analysis of these sounds (Hb. of Phon. §. 212), according to which they consist of "voiceless stop and voice glide" — he terms them also 'half-voiced stops' (§ 213) — seems to me to be insufficient, as he is not able to discriminate them from the 'pure tenues' on one hand and the Danish *[b d g]* (see below) on the other. If I am not mistaken, we have here not a fixed glottis-position during the stop, but a gliding from the open position to the voice-position, so that voice-vibrations begin to be formed the moment before the opening; this [ga] is accordingly $\gamma \mid O \mid 7$ / $\varepsilon \mid - \mid 1$ where *ɛ—* stands of course for *ɛ 3)* — (1 or rather *ɛ „)* — (1. This view was also that of the late Felix Franke with regard to his initial German [bdg][2].

[1] Children often imitate the bellowing of cows with [bu.] where b has got its *ɛ 1* from the [mu.]; [mbu.] occurs also. This may be utilized in teaching Danish children the voiced [b] of foreign languages.

[2] In English the fully voiced *O ɛ 1* seems also to occur often initially; cf. Sweet, *Sound Notation* p. 233 "I believe E. initial *g* may be 'voice stop and voice glide' as well as 'voiceless stop and voice glide'"; when in England, I thought I heard it continually.

The movement of the vocal chords in the opposite direction: ɛ ɪ) — (ʒ, is no doubt the usual pronunciation of English final *d* as in *head* [hed].

§. 78. We next come to a class of sounds, about which many phoneticians have written many pages, without, however, clearing up completely the mystery of their real nature. Names like 'whispered mediæ, reduced mediæ, voiceless mediæ, voiceless lenes, half-voiced stops, weak tenues' show the opinions entertained by various authors upon them. They occur in a great part of Germany for *bdg*, in Icelandic in the same cases; in Danish these sounds abound, as they are not only the prevalent form of [bdg], initial and medial, but also represent *pp, tt, kk* in such words as *hoppe* [hɔbə], *hatte* [hadə], *hakke* [hagə][1], *p, t, k* after *s* : *spille* [sbelə], *stille* [sdelə], *skille* [sgelə], and often also final *p, t, k* in such words as *op, hat, tak,* especially (but not exclusively) in the middle of a sentence : *op ad* [ɔb a], *tag din hat af* [t'a -din had a,], *tak i lige måde* [t'ag -i li.ə må.ðə].

Franke, in his review of Vietor's Phonetik[2], speaks of these sounds as follows: If the force of expiration is equal, the relative force of a sound depends on the first hindrance (hemmung) it meets, that in the larynx (cf. Techmer, *Intern. Zeitschr.* I, 163). If this hindrance is very great, the stream of air is greatly weakened when arriving at the other places of hindrance: the sound is weaker. If, on the other hand, the vocal chords are wide open, the whole force of expiration is directed against the hindrance in the mouth: the sound is stronger. The former sounds are voiced, the latter voiceless. The sounds in question are weaker than the voiceless (breath) sounds; there must be some hindrance in the glottis; the vocal chords, accordingly, cannot be so far from each other as for the breath sounds; neither can they be so near each other as for the voiced sounds, as in that case they would vibrate. If this view be correct, the sounds are no longer to be considered as a subdivision under the two other genera; they form a third co-ordinate category.

[1] *Begge* 'both' and *bekke* 'rivulets' are perfectly homophonous [bege]. In Icelandic, too, [ð] stands for written *pp* or *p* in words as *þjappa, skipa.*

[2] *Anglistische Studien* VIII, 336.

This solution is, perhaps, open to objection; yet it seems so superior to any other proposed, that I do not hesitate to adopt for these *[b, d, g]* sounds the sign $0\varepsilon 2$ [1] as intermediate between $o\varepsilon 1$ and $0\varepsilon 3$; in fact it seems to me that when I open the mouth after a *[b]* without producing a vowel, the feeble noise resulting is like that which begins an [h] (§ 110).

§. 79. The *tenues* also fall into three distinct classes. The most characteristic of these, that which is diametrically opposed to $o\varepsilon 1$, is represented by Danish and Icelandic *[p t k]* in the beginning of a strong syllable. Here the vocal chords are wide open ($\varepsilon 3$) not only during the stop itself, but also a moment after the explosion, so that a strong expulsion of breath results before the vowel with its $\varepsilon 1$ can be formed. The 'breath-glide', which has given to these sounds the name of 'aspirates', is, of course, most clearly perceived when the vowel is a high one; especially in such a combination as [t'i] or [t'y], where the consonant and the vowel are formed near each other, it is often heard almost as an *s* ($\beta 1_{\varepsilon}$ is nearly midway between $\beta 0^{\varepsilon\iota}$ and $\gamma 3^{\varepsilon}$). The combination [p'a t'a k'a] is symbolized:

$$\begin{array}{rr|c|} \alpha\,\beta\,\gamma & 0 & 7 \\ \iota & 3. & 1 \end{array} \quad \text{or, perhaps more exactly,} \quad \begin{array}{rr|c|} & 0 & 7 \\ & 3 & 1 \end{array}$$

§. 80. The [ptk] occurring in Danish weak syllables as the [p] of *epos* [e.pɔs], the [t] of *satan, Otto* [sa.tan ɔto], the *[k]* of *ekko* [æko] and of *kanon* [ka- no,n] seem to me to be identical with the common pronunciation of these sounds (before a vowel) in English *pea, tea, key,* in Swedish and Norwegian *på, tå, ko,* in North German *posse, tasse, kuh* [2].

They are generally characterized as feebly aspirated; the aspiration accompanying the explosion seems, however, to be nothing else but the simple consequence of the air being driven during the whole time of the closure from the lungs on to the place of stoppage without meeting any hindrance in the glottis or elsewhere. As the breath-glide is, accordingly, only the necessary consequence of the

[1] Or $o\varepsilon 2$, as the degree of energy in α, β, or γ, seems rather that of [b] than of [p].

[2] In a Dan. word like *epotiker* each of the three written tenues has a different degree of pronunciation: [ɛpo- t'e,gər].

position (α β γ)0 ð 0 ε 3, it has not to be separately symbolized, and our symbol for this sort of [*p, t, k*] followed by a vowel, is therefore simply: α β γ 0 | y |
ð 0 | .. |
ε 3 | ɪ |

Note also the influence of these tenues on following consonants; the *l, j, n, r, v* in Danish *plade, klæde, pjalt, kjole, tjene, knap, præst, tre, krig, tvivl, kvinde* is generally quite voiceless (ε 3), at least in the Seelandic pronunciation; in Jutland they are often only voiceless in their first parts, and this is also the case with *l, r* in English *please, class, private, cry, try*. English *tr* must, of course, be written thus:

β	0	ə	y
ε	3	—	ɪ.

But, if I am not mistaken, the combination

β	0	ə	y
ε	3	ɪ	ɪ

with a fully voiced [r] is also found in English: combinations like *to ride* are often pronounced so rapidly that the first vowel disappears completely, the sound being, nevertheless, quite distinct from that of *tried*; compare also the last syllables of *territory*. Similar combinations of initial voiceless stops and voiced [l, n, r] are exceedingly common in *police* (cf. *please*), *collect* (cf. *clash*), *perhaps, perambulator, career, correct*; and very few Englishmen are aware that they have in their own every day pronunciation of *connect* a fair imitation of the initial combination in German *knecht*, which always appears to them so difficult.[1]

§ 81. The French 'pure tenues' in *pas, tas, cas* are the same sounds as Dutch *p t k* and are said to be identical with the tenues of the other Romance languages and of the Slavonic group. Here there is no breath escaping after the explosion: the vowel begins with its voiced sound the moment the closure is released. Some phoneticians[2] have explained this by assuming a simultaneous closure

[1] In combinations like [ts, pf] (German *pferd, zeit*, etc.) no difference between *[t]* and *[t]* can be observed, as ε 3 is already an element of the sound immediately following the stop.

[2] Brücke, Kirste, H. Möller; with some hesitation also Ellis (see below) and Evans, p. 90.

of the glottis and of the upper organs; but as this has been contested by several good authorities, I will give my reasons for accepting their assumption. Unfortunately no instrument has been invented by means of which the glottis-state can be examined while a stopped consonant is being formed, and so we must rely on our muscular sensations which are necessarily subjective, and on more or less abstract reasonings which are not always a trustworthy guide in such matters as these.

§. 82. First I must mention some other combinations of $\alpha\beta\gamma$0 with ε0, which I have learnt to distinguish and which I hold to be different from the French tenues.

1) In Danish words like *soldat* [sol- $\underline{da}\dot{t}$] the ε0 is opened just before the β0 is formed.

2) In the dialects of West-Jutland a curious development has taken place wherever the older language had a double tenuis followed by [ə], as in *hatte, kopper;* now these words are pronounced [hat̥[1] k̥ɔp̥ɔr or k̥ɔp̥r]: the glottis is shut, but not opened, before the upper closure is formed.

3) If I reverse the order of the articulations in 2), I get a combination which I have heard in Prof. Lundell's pronunciation of Ossetian stops; the mouth closure explodes while ε0 is still held, and then, a moment after, the glottis closure is released with a second explosion.

4) Prof. Sievers pronounced to me the Armenian 'implodents'; here the $\alpha\beta\gamma$0 is strictly simultaneous; during the closure the air is pressed strongly against the vocal chords and causes the whole of the larynx to move violently upwards[2] (Cf. § 14, 5).

The analphabetic representation of these combinations is:

	1	2		3	4[3]
($\alpha\beta\gamma$)	y \| .. \| 0	y \| . \| 0	or y. \| 0	y \| 0 \| y	y \| 0 \| y
ε	1 \| 0 \| 3	1 \| 0. \| 3	1 \| 0 \| 3	1 \| 0. \| 1	1 \| 0 \| 1

[1] The final [ə] is always dropped in these dialects; the only difference between the singular 'hat' and the plural 'hatte' now consists in this ε0.

[2] See also Merkel, *Laletik* 149.

[3] § 4.

§. 83. If, after going through this series, I pronounce a French [apa], I have the same muscular feeling of closure of the glottis as in 4), only feebler; the air is not expelled so strongly from the lungs, and consequently the pressure on the vocal chords is not so strong, the larynx is only raised very little, if at all, and then the explosions of the two closures take place exactly at the same moment, if the glottis is not opened a little before the lips. As a fifth variety we have accordingly[1]:

$\alpha\beta\gamma$	y	0	y	
ε	ɪ	o	ɪ	.

Ellis seems to entertain a similar opinion, see *EEP* IV, p. 1097: 'for (t) the glottis is quite closed, but not so tightly as to be forced open by an explosion'; only $\varepsilon > 0$ (§ 86) would, perhaps, be a correcter transliteration of his words, especially when contrasted with his expressions on p. 1130: 'there is an air-tight closure, which is forced asunder'[2]. Besides I cannot agree with Ellis when he thinks the normal English tenues identical with the French ones, though admitting that 'some public speakers in England cultivate this habit [of pronouncing $\alpha\beta\gamma$0 ε 3], thinking that (tuu, duu) are thus more distinctly separated' (*EEP*, 1097). I have only heard very few Englishmen pronounce 'pure tenues' as Frenchmen do, and the pure tenues of a Dutchman with whom I conversed much in England, always struck me as almost the only feature by which I could hear that he was not an Englishman.

If the above explanation of French p t k is correct, it is very difficult to tell the reason of the voicelessness of [r] and [w] in [trwa] *'trois'* and [krwa] *'crois'*, although it may be accounted for in the same manner as the breath generally following the Danish stød (§. 65), cf. also Bell, *Vis. Sp.*, p. 98: "from the 'shut' position of the glottis we may either open sharply upon an utterance of voice or we may ease off the pressure of the 'catch' by interpolating a 'breath-glide'", and Ellis, *EEP* 1130: 'check glottid there may easily arise a puff of flatus before the chords vibrate properly'. — But how are we to explain the partial devocalisation of *l before t* in

[1] ɛ ɪ or o?

[2] In his translation of Helmholtz: *On the Sensation of Tone*, London 1885, p. 66 footnote, Ellis says that in English, French, Italian and Slavonic 'the glottis is quite closed' for the tenues.

bulletin and the breathed pronunciation of *r* before *c* in *arc* which is by no means seldom heard? This consideration sometimes makes me think that the only difference between French p t k and the 'weakly aspirated' p t k mentioned in §. 80 is a weaker expiration (ζ 1 or even 0) in the case of the former, so that very little or no 'voiceless air' is compressed behind the closure. No fully satisfactory answer seems possible with our present means of examination[1].

§. 84. A double closure is also possible with two parts of the tongue, for instance $\beta 0$ $\gamma 0$. English [kl] in *climb*, *class*, etc., often seems to begin with $\beta 0^{r}$ $\gamma 0_{l}$, and sometimes the $\gamma 0$ is totally given up, so that only [tl] remains; *likely* and *lightly* then become homophonous. In *first class*, *get clear* a distinct [k] is very seldom heard, and inversely *exactly*, *perfectly* are generally pronounced without a [t].

Clicks are often generated by suddenly breaking open one closure while another in still held;

$\alpha 0$	y	and	β	0	y	may serve as types.
$\beta 0$	..		γ	0	..	

§. 85. Where Analphabetic symbols are used, care must always be taken to symbolize properly the off-glide of a final shut consonant. If a group of signs ends with 0, this implies that the closure is held continually, and 0- must, therefore, be written if breath is allowed to escape after the closure. Some Indian languages seem to use final 0 and 0- in different senses, cf. Sweet, *Hb.* p. 213.

§. 86. Sometimes the closure is formed so loosely that the ear hesitates between the stop and the corresponding open consonant; this is represented by > 0. According to Sweet > 0 is often found in Portuguese [b d g]; and I have not unfrequently heard [g] after a long vowel pronounced by Norwegians in such a way that I fancied I heard the Danish open consonant [q] instead.

i, ii, (Divided consonants).

§. 87. Lip-divided consonants are easily formed, but seem hardly to occur as normal speech-sounds in any language. According

[1] The Saxon *h* or *g* before an *r* or a similar consonant (but not before vowels), as in *hriegt* = *Griecht* made the same impression on my ear as the French tenuis; only the following consonant seemed fully voiced.

to Storm, however, the Spanish soft *b* is $\alpha\,i^{b}$ (or ii), a pronunciation that is acknowledged by Schuchardt[1] only as an individual variety of the normal $\alpha\,2^{b}$. Perhaps we may infer that the ordinary pronunciation is $\alpha 1$, that is to say (§. 39) that there is a greater approximation (without contact), in the centre than on both sides.

$\alpha\ {}_{d}I$ (or II) is certainly a common form of [f] and [v], and this explains Bell's analysis of these sounds as 'divided'. The same remark applies to his analysis of [þ] and [ð]; in both cases a complete central contact (ii) is possible individually, while II and 2 are the two normal (and I think, equally normal) pronunciations.

§. 88. βii is the general type of *l*-sounds in most languages; thus βii^{d} or ^{e} in Icelandic *llf* [ɛ1], *allt* [ɛ3][2]), *klada* [ɛ3 or rather ɛ3—(1, cf. *kn* §. 74]; βii^{e} in French *là* [ɛ1], *table* [ɛ3], in Swedish *lag* [ɛ1] and *gaffel* [ɛ1 or, according to Lundell, Landmålsalf. 31, ɛ3]; βii^{ef} German *lachen* [ɛ1], *schlagen, klagen* [ɛ3)—(1', Danish *le, gaffel* [ɛ1], *sal, avl* [ɛ3 after stød, §. 65], *klage, plage, flage, slag* [ɛ3 or ɛ3)—(1][3].

βii is the sound resulting from older *rl* in the word *perle* in the dialect of Darum (Jutland).

§. 89. In all these languages the surface of the tongue behind the point is neither lowered nor raised; it is, however, a simple consequence of the position of the point and of the shape of the roof of the mouth, that there is more approximation at g than at h or i, but this is not important enough to be specially symbolized. In other cases the raising of some part of the tongue is so considerable as to modify sensibly the sound. Thus in a great part of Jutland, the *l* corresponding to old *ll* or *ld* is distinct from the ordinary *l* by being pronounced $\beta ii_{ef}\ \gamma 3^{e}\ \varepsilon 1$: [hɔl'. fal'.], Danish *holde, falde,* ON. *halda, falla*; and the same sound seemed to me to be that of the Russian palatalized *l*, when I heard it pronounced by a native some years ago; but I dare not be positive against Dr. Sweet's identification of it with French *l* in *elle*.

[1] Zeitschr. f. roman. philol. V, 307.

[2] The voiceless forms seem generally to have a tendency to be pronounced with i instead of ii to make the sound more audible.

[3] Dan. Vilhelm [vilhɛl,m] when unaccented (before a family name) often becomes [-vilɛlm]: the first *l* has ɛ2 (? ɛ3) and [h] disappears, as does sometimes the second [l] as well.

§. 90. If, on the other hand, we lower the front of the tongue behind the point-contact, that part of the muscles of the tongue which is thus put out of activity here, necessarily causes a swelling and consequently a higher position of a more retracted part of the tongue, and we thus obtain the 'gutturalized' *l* with a more or less pronounced *u-timbre*. βii^{te} γ3$_i$ [1] is the common English *l*, not only after a vowel, as in *well, hold,* and in syllabic function, as in *battle,* but in other positions as well, for instance in *lad, plaid,* etc. As far as I can hear, the only difference between these two cases in the pronunciation of most Englishmen is one of quantity rather than of quality. Dutch *l* in *volk* and *l* before a consonant in Middle-Jutland (*hyelp, folk*) is hardly different from the English sound.

English [l] has generally ε1; before a voiceless consonant as in *belt, help,* it is ε1 or ε1)—(3, seldom or never ε3; for [l] after [p], etc., cf. §. 80; for *cl* §. 84.

§. 91. Other l-varieties are formed without the help of the point of the tongue. The least doubtful instance seems to be the Italian *gl,* described by all phoneticans as βe γ ii^{g}. — The Russian guttural *l*, which, according to Sweet (*Russ. Pron.* 554) is 'pure guttural, apparently without any simultaneous point contact', that is γ ii$_l$, was pronounced by my authority as βii^{ef} γii$_l$. — In one word, *milk,* several Englishmen pronounce a pure γ-l without any point action; it seems to be γii$_{l_1}$, and consequently is not formed so far back as the Russian, which is perhaps often formed so far back as j or k, as sometimes the uvula vibrates when the contact is loosened.

§. 92. *Unilateral* [2] varieties of the different divided articulations occur in most languages as individual varieties. The Welsh *ll* is generally described as unilateral ($\beta\overset{\cdot\cdot}{\text{ii}}^{ef}$ ε3), but, curiously enough, the first Welshman I heard, pronounced it as a distinct bilateral sound, which was easily seen, as both his cheeks were blown out when he

[1] Instead of γ3 it would, perhaps, be better to write γ^{III} as the shape, which the front part of the tongue must have in order to divide the air, renders the same position of the back of the tongue as for [u] (with less approximation on both sides than in the middle) rather improbable.

The same remark applies to palatalised *l* §. 89 :βii γ^{III}.

[2] I have given above, § 2, l instead of ¦ as my sign for unilateral.

protracted the sound. Later I have heard the unilateral pronunciation of Dr. Sweet and also of Prof. Rhŷs; but the latter told me that his voiced [l] was also always unilateral.

§. 93. In preceding paragraphs we have already met with some cases of *'half-divided'* articulations (§. 44; §. 87, §. 90). γii^{s} seems to me a common variety of South French *l mouillé* as an intermediate stage sound between γii^{s} and [j] $\gamma 2^{s}$; I have also heard it sometimes in some Parisians' pronunciation of [l + j] in words like *singulier, milieu* and also in *meilleur*.

The most characteristic instance of this formation is, however, the Swedish and Norwegian 'thick l' (best described by Storm, EPh. p. 24 and Norvegia I p. 105, cf. Lundell p. 48). The half-division combined with the rapid moving of the tongue, in our symbols represented by a — between the two letters standing as exponents, gives to this peculiar sound the resemblance to a βr which strikes most foreigners who hear it; its formula is βii^{s-f} or βii$^{s)-(s}$ $s1$.

§. 94. Nasalized *l-* sounds are comparatively rare; they occur, however, as Passy has pointed out to me, in French familiar pronunciation of *l* between nasal vowels as in *en l'entendant* : l = βii^{s} $\delta 2$ or rather δ (1) between the two $\delta 3$. Also in Sanskrit, cf. Hoffory KZ. XXIII p. 550.

§. 95. δi, etc., seems impossible; si = whisper, cf. 44.

1.

§. 96. $\alpha 1$ is the lip elements of [w]. The ordinary English [w] in *wet, would,* etc., is $\alpha 1^{ab}$ βf $\gamma 4$; $s1$. Where a distinction between *w* in *wet* and *wh* in *whet* is still made, the latter sound seems sometimes to have $s3$ throughout, and sometimes to have only $s2$ as in [h] or s gliding from 3 or 2 on to 1. — The Jutlandic [w] in *Wolle* (proper name = *Ole*) is not appreciably different from the English one; *hw* in *hwa* 'what' seems never to have s 3, but rather the glottal gliding s 3)-(1.

French [w] in *oui* is, on the other hand, easily distinguished from the English sound; I analyze it as $\alpha 1^{a}$ βef $\gamma 2$; $\delta 0$ $s1$; before lower vowels as in *louer, louait, loi* it is rather a $> 1^{a}$ $\gamma >$ 3; and accordingly it closely resembles a Swedish [ω] §. 123.

The essential point in all [w]- sounds is certainly that the lip aperture is smaller than the back aperture, and it is, therefore, not

quite correct to identify [w] with a non-syllabic [u], as most comparative philologists do; a true non-syllabic [u] may occur in French *où est-il*, pronounced rapidly in two syllables: « $3^{a}.\gamma 3_{i}$.

§. 97. The difference between the [s]-sounds and the [š]-sounds is one of the most difficult in phonetics, and the most divergent opinions have been advanced as to the physiological nature of the difference. Before I try to analyze some of the s and š sounds, I shall transliterate a few of the views propounded by other phoneticians on this point; such a transliteration must, of course, always be approximative, and in many cases it is impossible, partly because of vagueness in the authors' expressions, and partly because they seek the reason of the distinction in spheres that lie completely outside of our physiological symbols.

Brücke: [š] = [s]with simultaneous [c] = $\beta 1\ \gamma 2^{x}$

Sweet: [s] = $\gamma^{x}1$ ('normal' fe, 'inner' f, 'outer' e)
[š] = $\beta 1_{n}$ ('normal' f or fg, 'inner' fg or gf, 'outer' fe)
(see especially *Hdb.* §. 112 and § 116)

Evans: (*Spelling Exper.* II, 99 sqq.):

	s-varieties			š-varieties		
β	2^{d}	2^{e}	2^{f}	$>2^{d}$	$>2^{e}$	$>2^{f}$
γ	$>2^{f}$	$>2^{g}$	$>2^{gh}$	2^{f}	2^{g}	2^{gh}

I use $\beta 2$ as a translation of 'a þ aperture', $\gamma 2$ as a translation of 'a ç orifice', and $>$ for the author's 'relaxed'. But I think there will be much more truth in the description, if we introduce the distinction between 1 and 2 as given above (§. 23) and the discrimination of blade and blade-point instead of the author's front and point. If we do this, we get the following definition of the normal positions for the two sounds:

$$s = \beta 1_{e}\ \gamma^{g}2\ ;\ š = \beta 2_{e}\ \gamma^{g}1.$$

Victor and Techmer seem to agree that š is 'frontal breiter' — that is to say, I suppose, >1 [1] — and 'sagittal länger' than s — that is expressed by a thick exponent such as $>1^{f}$. They, like other authors, especially Germans, also mention lip-rounding and pouting as a common means of giving more prominence to the characteristic š-sound.

[1] Inversely, Trautmann holds that the furrow is deeper for [s] than for [š].

Last, but not least, I quote the opinion of Mr. Ellis: "(s) in which the tongue is more forward and the back of the tongue not hollowed, and (sh) in which the tongue is more retracted and the back is hollowed"[1]. It will be seen that this description really says in a clear manner exactly the same thing which was afterwards expressed in a somewhat vague and ambiguous manner by Sievers. Note also that Ellis does not say that [š] is formed further back than [s], but that the *tongue* is more retracted for the former sound; the position of the tongue is best indicated by stating where the tip of it is.

§. 98. The most advanced [s] sound is $\beta\,1^{b}$; this is the '*s gras*' which Charencey has found in some American language and which „se prononce la langue entre les dents et touchant de sa pointe la lèvre supérieure".

The French [s] in *cigare, salle* is $\beta\,1_{ef}$, the Danish in *cigar, sal* is $\beta\,1_{fe}$, the English in *cigar, salad* is perhaps $\gamma^{r}1$ or $\gamma_{r}1$. All these sounds have $\varepsilon\,3$; French and English have the corresponding voiced sounds in *zèle, zeal:* $\varepsilon\,1$; and Danish has $\beta\,1_{fe}\ \varepsilon\,2$ before *[b d g]* in *spade, stade, skade*[2]. — A 'lisped' s is $\beta\,1^{c}$, it is quite distinct from [þ] = $\beta\,2$.

Norwegian *rs* in *vers, först* is $\beta\,1^{r}$; sometimes even $\beta\,1^{sr}$ and in vulgar pronunciation $\beta_{r}\,1$ (with the 'lower blade' of the tongue) may be heard. The normal upper Swedish pronunciation of the same combination seems to be $\beta\,1^{s}$ or 1^{sr} rather than $\beta\,1^{r}$.

Russian palatalised [s'] as in *avós(i)* 'perhaps' is $\beta 1_{e}\gamma 2^{s}$.

§. 99. The English [š] in *shilling* is $\beta\,1_{f}$ or $\beta\,1_{fg}$; the German [š] in *Schiller* is $\alpha\,5^{ba}\ \beta\mathrm{f}\ \gamma > {}^{s}1$ or something like that; the French [š] in *chat* seems often to be formed in the same manner as the German, only with $\alpha\,6^{b}$, sometimes it seems to have $\gamma > {}^{s}1$. — The [š] in the South of Sweden is very peculiar; $\alpha\,5^{a}$ or even $3^{a}\ \beta\mathrm{f}$ or $\mathrm{fg}\ \gamma > 1^{h}$; as, however, the tongue is not able to form a distinct chink so far back, $\gamma\,2^{h}$ would perhaps be the proper notation, and the sound often makes the impression of a rounded [x].

[1] *Early E. Pron.* IV (1874) p. 1104.

[2] Cf. Verner in Kuhn's *Zeitschr.* XXXIII, 536 ('whispered', not exact), and Hoffory in Scherer's *ZGDS*, 2nd ed. 603 4.

This analysis of the [š] sounds is only a very rough attempt; in many of the sounds there seems to be, immediately behind the proper point of articulation, a hollowing of the tongue (γ 5^{s}) terminated further back by a new approach of the tongue to the palate (γ 2 ?).

The Danish *sj* in *sjæl, chokolade, genere* is sometimes [sc], two pure sounds following each other without modifying each other; but generally the *s* is modified into β 1$_{f}$ γ^{s}1 with a very long chink, and then the [c] is left out altogether. —

The sounds mentioned in this and the preceding paragraphs have ∂0; the corresponding nasalized sounds seem never to occur.

§. 100.. δ 1 is the feeblest possible nasalization, frequent as an individual peculiarity, and not unfrequent, at least in Danish, in weak final syllables ending in the indistinct vowel [ə] as in *tradive* [*træðvə*].

ε 1 is 'voice', cf. §. 43.

2.

§. 101. α 2^{b} is the 'bilabial fricative' often used in German in such words as *schwer, quelle,* where it has ε 3 or ε 3)-(1. In central Germany it also stands (with ε 1) for written *b* in *aber, leber*. — α 2^{b} has also been supposed to be the open pronunciation of Danish *b* in *løbe, København, sæbe,* but these words have now either *[b]* = α 0^{b} ε 2 or the common Danish [v], see below.

In these cases α 2^{b} is accompanied by a passive state of the tongue: $\beta_{u}\gamma_{u}$; but in French [ɥ] [1] it occurs modified by a more or less strong γ-articulation. In *nuit, tuile* we have α 2^{b} (?ba) βo γ 3^{s} (or gf); in *nuée tuer* the same lip-position, but $\gamma > 3^{sh}$, in *continuait tuait* γ 5^{h}, and before an [a] sound as in *nuage, nuance* it is even more retracted: α 2^{b} β f γ 5^{h}.

We next turn to the 'dentilabial' sounds. The Danish [v] in *vild* and in every day pronunciation of *skabe sig* 'give oneself airs' [2] and many other words with *b* between two vowels, is α $_{dc}$2 or $_{cd}$2,

[1] Cf. *Phon. Studien* II, 91.

[2] Not in the more solemn *skabe* = 'create' which is always pronounced with b]. I pronounce generally [v] in *købe* 'buy' but [b] in *København*, possibly on account of the followin. consonant: [k'øbn- hau,n].

and North German [v] in *wild* is formed in the same manner: the lower lip is laid against the outer surface of the upper front teeth. In the English and French [v] in *revive, vive* the lower lip is more retracted and articulates against the lower edge of the upper teeth, which, in connection with the fuller voicedness, gives more buzz to the sound: $\alpha_{d}2\ \beta_{n}\gamma_{n}\ \delta 0\ \varepsilon 1$. This [v] necessitates a greater distance between the upper and the lower teeth (more lowering of the jaw) than the Danish sound[1]. — [f] is the corresponding breath consonant: $\varepsilon 3$; in Danish it generally has $\alpha_{cd}2$ as [v], but sometimes it seems to have $\alpha_{d}2$ as the French and Engl. [f].

$\alpha_{d}2\ \delta 2$ has been found by Passy in French *en venant.*

The Dutch initial *v* is often described as having $\varepsilon 2$; I heard Dr. H. Logeman's pronunciation as $\alpha_{d}2\ \varepsilon 3$)-1 with a distinct gliding effect, except in those cases where it was assimilated to a preceding sound, as in *'t vriest* with $\varepsilon 3$ and in *uw vriend* with $\varepsilon 1$.

§. 102. $\beta 2^{d}$ in Icelandic þ ($\varepsilon 3$) and đ ($\varepsilon 1$); $\beta 2^{e}$ rather than $\beta 2^{d}$ in English *thing* ($\varepsilon 3$), *there* ($\varepsilon 1$). In careless pronunciation of *no thank you* and similar expressions the [þ] is often reduced to $\beta > 2^{e}$, and some change is also introduced in ε, so that $\varepsilon 2$ or even $\varepsilon 1$ comes to stand for $\varepsilon 3$. — On a half-divided articulation of these sounds see § 87.

§. 103. A $\beta 2$ formed further back, with the tip of the tongue pointing upwards, while the outer front is made concave (cf. Sweet, *Hdb.* § 109) is a frequent substitute for trills. $\beta 2^{fc}$ is, I think, a frequent Norwegian form of *r* in *storm, være*[2]. The Færoic *r* is formed at the same place, but with a stronger friction: $\beta < 2^{fc}$; finally it often closely resembles a [z], as in *bòator* 'boat'. Old people (the Rev. V. U. Hammershaimb, for instance), often trill the *r*, especially after a consonant.

To this class of sounds also the English *r* before a vowel belongs, it is $\beta 2^{f}$; after [d t] it often resembles [ž š], because $\beta 1$ is passed in the transition from $\beta 0$ to $\beta 2$. English [r] is often modified by lip-rounding: $\alpha 5^{h}$. Sometimes the lip element seems stronger and may be 3^{h}, and this is one of the reasons why in affected or vulgar speech an [u] glide is frequently substituted for [r].

[1] On English $\alpha_{cd}2$ in *subvert* see §. 55.

[2] Not in *varm*, where it is long and distinctly trilled.

This is what the comic papers express by writing *kweachaws* for *creatures*, *Fwed* for *Fred*, etc. In the word *pretty* many people, who in other cases pronounce their [r] with well spread lips, round it very much on account of the [p], and the $\alpha 3^{b}$ $\beta 2^{f}$ often expells the following vowel entirely (*"pooty, putty"*).[1]

There is one more thing to be taken into account to explain the English [r], namely the 'relaxed back orifice' mentioned by Evans (*Sp. Exp.* II 101, cf. below § 114). Accordingly the following would be a complete transcription of a common English [r]: $\alpha 5^{b}$ $\beta 2^{f}$ $\gamma > 3_{h}$ [?] δ 0 ε 1.

The American [r] in *America, very* seems to me to be $\alpha > 3^{b}$ $\beta > 2^{\varepsilon}$, the lip element being more prominent and the point action less prominent than in England.

§. 104. Among the $\gamma 2$'s we must first mention the Danish 'open *d*', generally transcribed [đ], orthographically written *d* or *t* in *gade, blid, bede, sejlet*.[2] Sweet's description of it as a palatalized point-teeth open consonant (*Hdb.* § 128) is not quite correct, as the point of the tongue is not active at all. It is βe $\gamma^{\varepsilon}2$ δ 0 ε 1. This peculiar formation accounts for its similarity with no less than four other sounds: 1) [đ]: Danes generally imitate the English 'soft *th*' with their own 'open *d*', and inversely, and the difference is not very great in sound, as the friction is produced nearly in the same place. 2) [j]: in Jutlandish and vulgar Copenhagen dialect the [j]-sound is generally substituted for it, the tongue being shifted a little further back. 3) [z], from a variety of which it is distinct only by the looser articulation, no 'chink' being formed; in the exclamation *gud!* ('God!') the final [đ] is generally long and voiceless, at least in the latter part, and then it closely resembles [s]; perhaps the approximation is greater (<2 or even <1) here than in other

[1] Cf. Sweet *Hdb.* § 208 beginning; Storm *Engl. Philol.* 114, 121, 127; my remarks in *Nord. tidskr. f. filol. n. r.* VI, 253; Sweet, *Pr. of E. S.* § 102: 'E. *r* is rounded in individual pronunciation'. — Bell, *Sounds and th. Rel.* 29, says that $\alpha 2^{b}$ $\beta 2^{f}$ is frequent; here the lip element is hardly analyzed correctly, nor is Ellis's analysis of it as αr good (*E. E. P.* II, 605; *Pron. f. Singers* 66 b).

[2] In some combination there is a fluctuation between the open and the shut consonants ([*d*] or, finally, [t]). Those persons who pronounce the ending *-et* in past participles and in definite nouns with [t] or [*d*], have the same sound in *mûned, levned, hundrede, kaldede, slyngede*, etc. In all these cases I have [đ]. In *sejlets t* = [t].

cases. 4) [l]. As early as 1821 it has been remarked by J. H. Bredsdorff[1] that 'children and foreigners not unfrequently say *trelleve* instead of *tredive*'; and the same word [trælvə], as pronounced by me, was written down as *tralve* by a Dutchman, an English and a French lady. In other words, however, my [d] did not make this impression, and the reason of the mistake in *tredive* is, I presume, the half-divided character of [v] (cf. § 87); perhaps our [d] itself is also half-divided, γ li, so that both sounds contribute to the *l*-effect.

The Dan. [d] has ε 1, except finally, where it is ε 1) — (3; after an unaccented vowel, as in *skibet*, it may even have full ε 3.

§. 105. Further back we meet the usual [j] sounds, the normal position of which is $\gamma 2$. — The French [j] varies according to the adjoining vowel; in *fille* [fi.j], *piller* [pije] it is $\gamma\ 2^{\varepsilon t}$, in *bien*, *hier*, it is really a non-syllabic [i]: $\gamma\ 3^{\varepsilon t}$, and in *travail*, *paille* the [a] or [ʌ] draws it further down to $>3^{\varepsilon}$ or, perhaps, $<5^{\varepsilon}$. — The German [j] seems always to have $\gamma\ 2^{\varepsilon}$; in the Berlin pronunciation of [j] for *g* in *gleich*, etc., there seems even to be a greater approximation: $<2^{\varepsilon}$. — The Danish [j] is unstable; before a high vowel, as in *jubel*, it is $\gamma\ 2^{\varepsilon}$ or very near to it, while in *ja* it is often as low as $\gamma\ 5^{\varepsilon}$, so that really it cannot be termed a 'consonant' any more. — The English [j] as in *you*, *yet*, *yard* is never a true $\gamma\ 2^{\varepsilon}$, but generally $\gamma > 2^{\varepsilon}$ or $\gamma\ 3^{\varepsilon}$ or even lower. The lips often assume the $\alpha\ 4^{c}$ position, but $\alpha\ 6^{b}$ is at least as frequent.

In all these cases we have ε 1; French [j] in *pied*, *monsieur* and Danish [j] in *kjole*, *fjalt* have ε 3 or ε 3—(1; Engl. [hj] in *hue* seems to have ε 2 or ε 3—(1 varying according to the speakers.

$\gamma\ 2^{\varepsilon}\ \varepsilon 3$ is German *ch* in *ich*, *echt*; it may sometimes be heard (in Saxony, but also in Berlin) so advanced and so strongly hissed as to be very near a [ʃ]: $\gamma < 2^{t\varepsilon}$. — Norwegian *kj* in *kjöre*, etc., is generally identified with the German sound, but I think it is rather $\gamma\ 2^{h}$; it is pronounced by some Norwegians in such a manner that I think constantly to hear a feeble $;0^{h}$ before it, but the existence of such a shut consonant is denied by the native phoneticians. — In Danish *sligt*, *digt*, *agte* the shut pronunciation of *g* as [k] alternates with the open, and the place of the latter depends on

[1] In his ingenious little book: *Om Aarsagerne til Sprogenes Forandringer*, p. 6 (Reedited by Vilh. Thomsen, 1886). — Cf. Möbius, *Dänische Formenlehre* 1871, p. 38: *tredive* (dreissig) lautet tred've (oder vielmehr trel've).

the vowel: $\gamma 2^{g}$ in [slict], $\gamma 2^{g^h}$ in [dect], $\gamma 2^{b g}$ in [secto]. But even in the first of these words, the sound is not exactly the same as German [c]; the Danish sound has probably $\varepsilon 2$, the German one certainly ε 3.

§. 106. γ 2 formed with the back of the tongue is [q] in Dan. *bage*, North German *tage*, generally $\gamma 2_j$; the German sound is often, at least in Berlin, accompanied with a feeble uvular trill: $\gamma 2_j \partial 0_r$. — After an *i*, as in *tiger*, the Danish sound is generally somewhat advanced and palatalized: $\gamma 2_i^{je}$; in many familiar words as in *pige*, *sige*, it is hardly ever heard, the consonant being totally assimilated with the vowel: [p'i.ɔ, si.ɔ]. — After a back round vowel as in *smoge* the lip rounding is generally retained during the consonant, which thus acquires some similarity with [w]; after *o* and *u* it generally disappears altogether, as in *nogen*, *uge*, *fugl*. — Before a pause, [q] as all other Danish open consonants ends breathed: ε 1—3, and sometimes it even has ε 3 throughout.

The German *ch* after back vowels is $\gamma 2_j \varepsilon 3$; in Berlin not unfrequently with $\partial 0_r$; after round vowels with α 3, 5, 7, as the case may be. — $\gamma 2_j \varepsilon$ 3 is also the Florentine pronunciation of intervocal *c* as in *la casa*. — On the Danish *g* in *gt* after back vowels as in *magt*, *bugt* the remark made above on *g* in *sligt*, etc., holds true mutatis mutandis; it is $\gamma 0$ or $\gamma 2_j \varepsilon$ 2 (in *bugt* with $\alpha 5^{nb}$).

§. 107. γ 2 is often used as a substitute for *r*-sounds; cf. below § 114. Thus in Parisian French $\gamma 2_k$ or rather $\gamma 2_{\mu k}$ is, as far as I have been able to hear, much more frequent than any trilled sound (βr or $\partial 0_r$); only it must be noted that in speaking emphatically or passionately the want of a more distinct sound is easily and naturally remedied by trilling the uvula, the result being $\gamma 2_k \partial 0_r$. — Thus also the r of many Germans, especially in Berlin, is $\gamma 2_k$, sometimes modified by $\gamma 3^{g}$ before [c] as in *durch*. — These *r*-substitutes generally have ε 1; ε 3 or 3—1 after a breath consonant as in Fr. *prie*, G. *kriege*.

Further back still is formed the ordinary Danish consonantal *r*; it is $\gamma 2_l \varepsilon 1$ in words like *drive*, *vred*, *nerve*, *harrig*, but $\gamma 2_l \varepsilon 3$ not only after breath consonants (*krige*, *fred*), but also before such when the preceding vowel is short (*lirke*, *harpe*, *torsk*, *skarf*) and finally after a short vowel (*kar*, *var*, *for*). In the beginning of a sentence *r* has often ε 3)—(1 instead of ε 1, and many persons

even make it quite voiceless in this case. — An adjoining round vowel generally rounds the *r*, as in *bruge* (*a* 3), *kurtig* (*a* 5); but the *r* has not in itself lip-rounding;[1] the tongue-point is retracted: *βf* or *fg*. — The two $\gamma\ z_1$'s in *ærgre* draw the [q] somewhat back and down, so that the effect which [rq.r] = $\gamma\ z_1 \mid z_k \mid .. \mid z_l$ makes on a foreigner's ear, is that of an extremely long Danish *r*. In *færge*, on the other hand, [q] is normal as in *bage*. — On the throat element of Danish *r* cf. § 115, on our vocalic *r* cf. § 122.

[I may add here that sometimes my own (and some of my countrymen's) Dan. *r*, especially after a pause, is a very peculiar sound which I take to be $\gamma 0_l$ without, however, being sure of the exactness of this analysis; it is not improbable that by the great retraction of the tongue the epiglottis is forced back and that it is really this organ that shuts the air-passage, in which case we would have $\epsilon^0 1$].

§. 108. ∂z is, as already stated above (§ 42), the normal nasality. It is exceedingly frequent in consonants; [m n ŋ] and nasalized [j] and [l] have been mentioned above. An $a z^b\ \partial\ z\ \epsilon\ 1$ was pronounced to me in Færoic *gamli* by Mr. J. Jakobsen. — In some cases the nasalization does not go through the whole of a consonant; so in the German *haben* the pronunciation with

a	0	..	
∂	—	*z*	

is a frequently heard intermediate stage between [ha.bm] and [ha.m]; in *vorhanden* the last three sounds, instead of being

β	0	..	..	
∂	*z*	0	*z*	

are often

β	0	.	0	
∂	*z*	(0)	*z*	

, the [d] = $\beta 0\ \partial 0$ not being fully reached. — Similarly in French, when two homorgane shut consonants follow after a nasal vowel, the first is wholly or partly nasalized, so that *en dedans* is pronounced

	ã	d	d	ã
with *∂*	3	—	0	3
or *∂*	3	*z*	0	3
instead of *∂*	3	0		3

So also *pain de douleur*; in *vingt-deux, trente-deux*, there is also glottal assimilation from *s* 0 to *ɛ* 1 in *t*. A remark made by Prof.

[1] The frequent occurrence of our *r* being mis-heard by foreigners as an [o] or [u] is due to the circumstance that tongue-retraction and lip-protrusion have the same effect of lengthening the resonance chamber; cf. Evans, who, however, overvalues the importance of his discovery (*Spell. Exper.* II 61).

Storm[1] on this phenomenon gave rise to a controversy between himself and M. Joret, which would certainly have been shorter and clearer, had the two opponents been able to avail themselves of Analphabetic symbols for the sounds they discussed.[2] I have several times heard pronunciations like those above symbolized, but never the form indicated by Storm, of *vingt-deux* as

	v	æ	n	d	d	ʊ
with ∂	0	0	꜀2	0	..	..
instead of ∂	0	3		—	0	..

Vowels with ∂2 are also frequent in many languages. (Cf. § 43). In my pronunciation of Danish every long vowel between two nasal consonants has ∂2 (*mine, mene, mane, måne, none*); in some dialects nasalization is much more widely spread, and in many parts of our country (Funen, Vendsyssel) the nasal consonant ŋ or palatal n has disappeared after having given its ∂2 to the vowel.

§. 109. The French nasal vowels have normally ∂3, but in the *liaison* they seem generally to have ∂2 and to be changed in other respects as well. It will be best to give here at once the complete analysis of these sounds:

[ã] = *an* is normally $\alpha 8^{bc}$ βg γ > 7_{kj} ∂3 ɛ1,
but in [s ãn ale] α > 8 βg γ < 7_{kj} ∂2 ɛ2.
[õ] = *on* is normally $u7^{ba}$ or ^{ab} βg γ (<) 7_{jk} ∂3 ɛ1,
but in [õn a] α < 7 βg γ > 5_{jk} ∂2 ɛ1.
[ẽ] = *in* is normally $\alpha 8^{bc}$ βfe γ > 7^{gh} ∂3 ɛ1,
but in [bjẽn æme] α < 8 βfe γ < 7^{gh} (? 5) ∂2 ɛ1.
[œ] = *un* is normally $u < 7^{ba}$ βfe γ > 7^{gh} ∂3 ɛ1,
but in [œ̃n ami] α < 7 βfe γ < 7^{gh} (? 5) ∂2 ɛ1.

§. 110. We next come to ɛ2. This is the glottal element of the [h] sounds. There are, however, different degrees of [h]-sounds, due, I think, not so much to varying force of expiration (ζ) as to varying distance between the vocal chords. The 'strongest' [h] has ɛ3 and, consequently, a great expenditure of breath; I have noticed it in one English clergyman's constant pronunciation of *the Holy Ghost*, and it may sometimes be heard in the Danish exclamation [aha.] where it expresses the highest surprise. — ɛ2 is the normal

[1] *Englische Philologie* p 38, 428, cf. L. Havet, *Romania* VIII, 96.
[2] *Revue Critique*, Oct. and Dec., 1882.

[h] in English, German and Danish.[1] — When an *h* in Danish stands in the beginning of a word with weak sentence-stress, as in *du har været* or *da han kom*, s_2 is seldom reached, but if the *h* is not entirely dropped, there is a movement towards the s_2-position:

	d	a	h	a	n	
s	2	1	(2)	1	..	,

and this very feeble *h* seems to me identical with the French sound of *h* in *dehors, le onze,* if any *h*-sound is heard at all.

A final [h] is heard after all Danish vowels before a pause: [ih vah] written *i, hvad;* it is s_1)—3 rather than s_2. — Czermak and Brücke analyze the Arabic *hha* as s_2".

§. 111. As regards the mouth-position for the [h], it is evident that when [h] is placed between two identical vowels as in [aha ihi], the mouth-position is kept throughout. When it stands between two different vowels, the changes of articulation necessary for passing from one vowel to the other generally take place during the s_2; thus in Danish *påhit:*

α	7	—	4
γ	8_j	—	3^5
ε	1	2	1

When [h] is initial, the position of the following vowel is as a rule anticipated; but sometimes the s_2 is only accompanied by a glide towards the vowel-position, which is not reached till the moment the voice sets in. This seems to be the case with Lundell's [h] (see Sweet, *Spoken Swed.* 468), but according to Lyttkens and Wulff (p. 301) the anticipation is also usual in Swedish.

English *here* may often be heard pronounced, not as

	h	i	ə			h^i	ə	..	
γ	4	..	>6	but as	γ	4	>6	..	, so that a voiced [i] does
ε	2	1	..		ε	2	1	..	not appear at all.

The definition of [h] as a 'voiceless vowel bearing the same relation to a voiced vowel as does [s] to [z]' is not correct, notwithstanding its being advocated by authors like Whitney and Hoffory. In the first place [h] is not voiceless in the same manner as [s]; whereas [s] has s_3, [h] has s_2. (For an exception see above). And secondly really voiceless vowels occur without having the character

[1] Or is the Danish [h] stronger than the German, as Prof. Sievers told me? $s > 2$?

of an *h*, as in French final syllables with ɛ3,[1] in Russian, in the last syllable of Portuguese *Porto, amamos* (ɛ2), in the Danish interjection *pyh* (ɛ3 throughout), etc. In order to be conceived as an *h* the voiceless vowel must be pronounced immediately before or behind a voiced vowel.

§. 112. ɛ2 used in other sounds than [h] has been mentioned above: § 78 */b d g/*, § 98 *[ʒ]*, § 101 *v*, § 111 Portuguese unaccented vowels.

r

§. 113. A labial trill, α r^{a} ɛ1, often with simultaneous uvular trill, ∂0$_{r}$, is used by Danish drivers to stop their horses. According to Hoffory[2] α r is also substituted for the breath-glide between α0 and [u] in Danish words like *puls, pund;* I have never noticed it, except perhaps in the sound-imitating word *pruste (puste).*

βr is much oftener used as a speech-sound; it is still the ordinary *r*-sound in many countries; Sweden (except the southern part), Norway, Iceland, Russia, Italy, etc.

It is found dialectally in Denmark, England, Germany, France, etc. The place of the r is generally f, sometimes further back, as in Jutland where βr^{ɛ} seems a common variety (cf. § 58). — In Portuguese, Dr. Sweet distinguishes between a stronger and a feebler trill, which might be written βR and βr; the only Portuguese I have had an opportunity of hearing, did not trill the weak *r* and distinguished the two sounds as βr^{f} or βr^{fa} in *foi á Roma,* and β2^{fa} in *aroma.*

βr has oftener ɛ1 than ɛ3; βr ɛ3 is well known in Icelandic; it occurs also in Swedish *vänstr, högr* as words of command.[3]

∂0$_{r}$ — uvular trill — is the other form for trilled *r*. It is comparatively common in France, in Germany and in the southernmost part of Sweden; in England it is called the Northumbrian burr', and in Denmark it is among educated people the only way of trilling *r*, but in every-day life it is very seldom heard. — Rounded α1^{a} ∂0$_{r}$ in French *roi,* etc.

[1] I have attempted to establish the conditions under which this voicelessness occurs, in *Phon. Studien* II. p. 92.

[2] Kuhn's *Zeitschr.* XXIII, 536.

[3] Lundell, p. 44.

§. 114. There can be no reasonable doubt of the universality of the βr in all the older stages of the Arian languages, and as now other sounds are substituted or are being substituted for this original βr, the question naturally arises: what it the reason and what is the origin of this movement? Prof. Trautmann gives the following answer[1]: the abominable uvular trill is a fashionable folly that came in some two hundred years ago and was propagated by a set of affected Parisian ladies; it was introduced in Germany like other French fashions at a time when the national feeling of the Germans was still sleeping, and now ð0$_r$, which they had to learn 'by the sweat of their brow', is constantly gaining ground because it is thought genteeler or more stylish than βr.

I do not think Prof. Trautmann has set the question at rest. In itself it is not very probable that such a changement should be propagated *exclusively* by fashion, and Prof. T. certainly attributes too much to *conscious* imitation, when he speaks even of learning with difficulty the new sound in order to avoid the appearance of vulgarity, or when he says that German society in the seventeenth century and the first half of the eighteenth were too stupid and too wooden (hölzern) to invent the ð0$_r$ of their own accord! — And in fact, the only quotation on which he bases the whole of his theoretical constructions, does not mention expressly the 'burr' of the Précieuses, but their *parler gras* (Chapelle). Now the first and principal meaning of this phrase is, according to Littré: *parler comme si on avait quelque chose de gras, de pâteux dans la bouche*; and only secondarily Littré says: *parler gras signifie aussi grasseyer.* For the latter signification Littré has not found a single example in the French literature, so that we must be justified in taking the passage in Chapelle in the general sense of an indistinct or affected manner of pronouncing without any special regard to *r*.[2]

Prof. Trautmann's positive argument for his pet theory is, then, of no very high value; but there is very strong negative evidence against it: Neither in his *Précieuses ridicules* nor in his *Femmes savantes* does Molière allude to the pretended fashionable pronun-

[1] *Anglia* III; *Die Sprachlaute*, passim.

[2] The term *grasseyer* too is in itself rather vague and is often used of other 'faults of speech' than ð0$_r$.

ciation. He has shown, however, in the famous scene of the *Bourgeois Gentilhomme* (II, 6) that he knew full well what a lingual *r* was; and he would certainly not have failed to ridicule the 'burr' as well as the other fashions of the Précieuses and their imitators, if it had really been such a fashion.

Two tendencies are to be distinguished with regard to *r*; one is to 'untrill' it, so that ɹ replaces r; the other is to shift the place from the tip to the back. Prof. Trautmann regards the latter as the more important, while in my view the untrilling is the primary change, in comparison with which the shifting back is only of secondary importance.

My own theory which I venture here to set forth without any learned apparatus, thinking that common sense speaks in favour of it, is this: ʃr claims a great expenditure of breath; it is not easy to produce a distinct trill when speaking in an undertone. In former times when people lived more out of doors than now, they consequently also spoke more in the open air than we do and, in order to be understood, they had therefore to speak louder, that is, with greater expiratory force than we generally do. This favoured the keeping up of the ʃr. But as man came to live more and more in-doors, he would accustom himself to a less noisy manner of speaking; it was not so necessary to speak very loud, and it might even in some cases be dangerous, for walls have ears. The boisterous ʃr then came naturally into disuse because of the difficulty of trilling it properly, and this happened spontaneously wherever the same social circumstances favoured it; there was no necessity for borrowing this pronunciation from foreigners as it would present itself as a matter of course. The principal result was ʃz; this sound, still kept as the normal *r* in English and Faeroic, has been a common one in France in the sixteenth and seventeenth centuries, as is shown by the transition from [r] to *s* or rather [z] in words as *chaise* and in many names of places such as *Ozoir*; the transition to [đ] is also found.[1]

But ʃz rarely subsists except where it is formed comparatively far back (f or even g). Another element, which had formerly but

[1] Cf. on these changes especially Joret in *Mém. Soc. Linguistique* II, 156, cf. III, 165.

a subordinate part to play, now comes to the front: I mean the raising of the back of the tongue which is necessary to produce βr, as the foremost part of the tongue must be made as thin and slender as possible in order to render the vibrations easy. This back element is scarcely noticed in βr, and probably the distance between the tongue and the palate is often more than 3; but when no trilling is produced, it is apt to become γz; in course of time, then, the βz gets superfluous and is dropped.

But along with this βz or γz, developed in-doors, the original βr was kept up and used whenever a loud and distinct utterance was required. This was at first — and is still to a great extent — done quite unconsciously; a fully trilled βr may, for instance, be heard very frequently at open air meetings in London by speakers who cannot be suspected of having learnt artificially the βr for rhetoric purposes and who fall back to βz when not speaking with emphasis or in excitement. Where, however, βz is not preserved so distinctly as in English, the back element being predominant, and more still where the point action has been entirely superseded, the want of a trill to give the γz force as an *r* is most easily supplied by letting the uvula vibrate. There is already some tendency towards adding a uvular trill to back open consonants, as shown in Berlin pronunciation of [q] in *wage* and [x] in *wache* and in Dutch [q] in *goed* and [x] in *schep*, which are generally γz; ∂0ᵣ; but of course this tendency is much stronger in a γz which is co-ordinate with a βr. Where the parents speak γz within four walls and βr in exceptional cases, their children will easily acquire γz as the ordinary sound and γz ∂0ᵣ as an emphatic form.[1]

This theory gives a natural explanation of two facts which seem to be of some importance with regard to the development of these sounds. In the first place, the substitutes for βr begin to make their appearance in large *towns:* in London, Paris, Berlin, Copenhagen, etc., while peasants will stick to the old boisterous open air sound longer than town people. And secondly *ladies* adopt the weaker sound more easily than men: Dubois, in 1531, and Brekke, in 1881, agree in ascribing the pronunciation of *r* as βz

[1] Sometimes, also, a βr ∂0ᵣ is pronounced; it is not easy to tell the sound of this double trill from the simple βr.

or $\beta<_2$ approaching to [ʒ] to "nos femmelettes de Paris" and to "Kristiania-damer med en affekteret, *mincing* udtale".[1] The βr is considered more manly, and this circumstance, in connection with the musical qualities of βr, favour its being now taught artificially to singers and actors who speak naturally γ_2 with or without $\partial 0_r$.

In former times the untrilled consonant *s* was changed to the trilled *r* in the old Romance language (Latin *auris*) as well as in the old Germanic tongues (OE. *eare*, OHG. *ōra*, ON. *eyra*). A good many centuries later the trilled *r* is supplanted by untrilled consonants in modern Romance as well as in modern Germanic languages. Is it too bold to assume that these opposite tendencies are due to changed social habits, and that in both cases we have to do with developments occasioned independently at different places by similar circumstances?

§. 115. Trilling of the vocal chords, εr, has already been mentioned above (§ 44). It is sometimes used as a substitute for voice, but seems somehow to be in favour of *r*-sounds and *r*-substitutes. I myself, and many of my countrymen, use constantly εr instead of $\varepsilon 0$ and ε_1, when these (stød and voice) happen to meet in an *r*-sound; thus in the definite noun *arret* = [ʌr,ɔð], but not in the participle or adjective *arret* = [ʌrəð]. [r,] in the former word is a_n βfg γ_2, $\partial 0$ εr. But this is the only case in which Danish uses εr, which accordingly is not to be described as our usual *r*, as has often been done. Sievers remarks,[1] that he has heard Danes pronounce *kar*, *har* with $_\varepsilon r$ during the vowel; but these two words are not treated in the same manner. In *kar* the vowel is short [ʌ] and the *r* consequently voiceless = γ_2, ε_3; when the definite article is joined to it, *karret*, the stød appears: [kˈʌr,ɔð] and the *r*, but not the vowel, has εr as in *arret* above. In *kar*, on the other hand, the vowel is long and has stød [ha,r] when the word is accented; unaccented the word loses its stød and sometimes its *k* and *r* too, but in neither of these cases εr appears. — Sweet describes Danish *r*, not as the glottal trill, εr (which he would have represented in his Narrow Romic by κr), but as voice + "contraction of the superglottal

[1] *Bidrag til dansk-norskens lydlære*, p. 17.

[2] *Grundzüge der Phonetik*, 3d ed., p. 109.

passage or 'false glottis', the opening being further narrowed by depression of the epiglottis... the laryngal action being combined with retraction of the tongue and rounding, so that the sound is really (ʀ + ghw)" (*Hb.* § 20). This would be $\alpha 3$ or 5 $\gamma 2$ $\varepsilon^{2}1^{x}$. As said above, § 107, the lips are only rounded under the influence of an adjoining round vowel; the contraction of the false glottis and the depression of the epiglottis, if they exist at all, which I am not sure of, may be organic consequences of the extreme retraction of the tongue (cf. § 14).

3—8.

VOWELS.

§. 116. In dealing with the vowels I shall as a rule let my symbols speak for themselves without accompanying them with a comment, as I hope the reader will now have become familiar enough with the Analphabetic signs to understand them at once. ∂ 0 ε 1 is always implied.

High vowels.

[i] in French *fini*: α 4^{o} βe $\gamma 3^{\varepsilon f}$ or even 3^{ε}.

[i] in Danish *vide*, Swedish *vin*, G. *wie*: $\alpha 4^{b}$ βe $3^{\varepsilon f}$ or 3ε.

English *[i]* in *bit*: α 4^{b} βe γ 4^{ε} or $> 4^{\varepsilon}$; decidedly $\gamma > 4^{\varepsilon}$ in unaccented syllables such as *lucky*; before an *s* (in *mister*, *miss*) it seems often to be $\gamma 3^{\varepsilon}$. German *[i]* in *bitte* α $4^{bc}\beta$e $\gamma 3^{\varepsilon}$ or oftener 4^{ε}.

In Danish the short *i* in *dit*, *sidst*, *Ib*, has $\gamma 3$, but the difference between this and shortened [i] = $\gamma 3$ is almost imperceptible. In the pronunciation of a Norwegian friend of mine I discovered a difference in the treatment of short *i*; in *finde*, *linned*, *skin*, *gift*, *skipper*, *skik*, *gig* he had distinctly $\gamma 3$, but before *l*, in *spille*, *spilde*, *ilde*, *pille* pure $\gamma 3$; but this may be individual.

Before *r* in a few Danish words *i* and *y* are peculiarly modified: $\alpha 4^{b}$ $\beta 4^{fe}$ (not resting in the bottom of the mouth) $\gamma 4^{\varepsilon h}$ in *birre*, *birke*, and the corresponding round vowel in *fyrre*, *tyrk*. Many people pronounce the vowels in these words as [ɐ ɞ] in § 120, 121.

The first element of E. [ĭ] in *beat* is $\alpha 4^{b}$ βe $\gamma 4^{\varepsilon}$; has the second really $\gamma 2^{\varepsilon}$, or possibly $\gamma 3^{\varepsilon}$?

§. 117. The round vowels corresponding to [i] are the following [y]-sounds. French *u* in *lu, lune* : $\alpha 3^{a}$ βe $\gamma > 3^{sf}$.

Danish *y* in *lys* : $\alpha 3^{ba}$ or 3^{ab} βe $\gamma 3^{s}$.

German *ü* in *über* : $\alpha 3^{ba}$ or 3^{ab} βe $\gamma > 3^{s}$.

Swedish *y* in *ny* : $\alpha 5^{aa}$ βe $\gamma 3^{s}$; the peculiar form of lip-rounding, which some Swedish phoneticians call out-rounding (utrunding), consists in protruding as much as possible both lips so that they make a sort of tube; the distance between them being greater than in other [y]s, there is some approach to [i] which helps to differentiate the sound from [ɯ].

German *ü* in *hütte* : $\alpha 3^{ba}$ βe $\gamma 4^{s}$.

§. 118. [ɪ] in Russian *ы* : $\alpha 4^{c}$ (4^{cb}) βf $\gamma 3_{i}$.

The Welsh corresponding sound seems according to Sweet (*Spoken North Welsh*, p. 7, cf. *Spoken Portug.* p. 4) to be $\alpha 4^{c}$ β? $\gamma 3^{h}$.

Norwegian [ɯ] in *hus* : $\alpha 3^{ha}$ βf $\gamma 3_{i}$.

Swedish [ɯ] in *hus* : $\alpha 3^{b}$ βef $\gamma 3^{h}$ or sometimes lowered, 5^{h}.

English unaccented [ɯ] in *value*[1] : $\alpha 5^{b}$ βf $\gamma 4_{i}$; also the first element of Cockney [tɯw] for *two* (the second = $\alpha 3^{b}$ βf $\gamma < 4_{i}$ or still higher).

§. 119. [u] in French *sou* : $\alpha 3^{a}$ βfg $\gamma 3_{j}$

[u] in Danish *hu, due* : $\alpha 3^{ba}$ βg $\gamma 3_{j}$; the German [u̇] in *kuh* is generally identical with this sound, but in some speakers' pronunciation it seems to approach to Swedish [ʊ] and is, perhaps. $\alpha < 3^{ab}$ $\gamma > 3_{j}$.

Swedish 'short *u*' in *kung* : $\alpha ?6^{b}$ βg $\gamma 3_{j}$ or $?4_{j}$.

German *[u]* in *und* : $\alpha 3^{ba}$ βfg $\gamma 4_{j}$ (or 3_{j}?).

English *[u]* in *good, put* : $\alpha 3^{b}$ βfg $\gamma > 4_{j}$. The first element of E. [uw] is $\alpha 3^{b}$ $\gamma 4_{j}$, the second $\alpha > 1^{b}$ $\gamma < 4_{j}$ — I do not think that it is really the same sound as in *we*.

Danish [u] in *putte, hund* : $\alpha > 3^{ba}$ βfg $\gamma 3_{j}$.

Mid vowels.

§. 120. [e] in Germ. *see*, Sw. Norw. *se*, Fr. *été* : $\alpha 6^{bc}$ or 6^{cb} βe $\gamma 5^{s}$. This is also a common pronunciation of Danish [e] when an *r* precedes or follows (*frede, mere*), but generally our long [e] as in *se, bede* has $\gamma < 5^{s}$.

[1] It seems frequent in stress syllables after [j]: *peculiar, obscure, during*.

Danish [e] in *fik, finde, hedt* (cf. §. 35) $\alpha 6^{be}$ βe $\gamma < 5^{\varepsilon}$; *i* in *Rikke* has $\gamma 5^{\varepsilon h}$.

[e] in Engl. *pen*, Norw. *pen*, North G. *fest*: $\alpha 6^{b}$ βe $\gamma 6^{\varepsilon h}$.

French *maison, aimer, médecin* have generally in the unaccented vowel a sound which seems exactly half way between [e] in *été* and [æ] in *aime*; sometimes it is nearer to [e] = > 5, sometimes almost [æ] = < 7, but I do not hesitate to analyze the normal form of it as $\alpha 6^{ba}$ βef $\gamma 6^{\varepsilon h}$.

§. 121. The [ø] in French *peu*, Swed. and Norw. *dö* is $\alpha 5^{be}$ βe $\gamma 5^{\varepsilon}$ or $5^{\varepsilon h}$; German *höhe* with $\gamma > 5^{\varepsilon h}$; Danish *føde* has $\gamma > 5^{\varepsilon}$, though the difference between the Danish and the French [ø] sounds is not so marked as between the corresponding unrounded vowels.

Danish *ø* in *lyst, skylle, søster* is $\alpha 5^{be}$ βe $\gamma(>)5^{\varepsilon}$; after an *r* as in *rørt* rather $\gamma 5^{\varepsilon h}$.

German and Norwegian *[ö]* in *götter, städt*: $\alpha 5^{be}$ βe $\gamma 6^{\varepsilon h}$; in German perhaps $\gamma > 6$, in Norw. sometimes $\gamma 5^{\varepsilon h}$.

French [ɷ] pronounced in the first syllables of *dehors, crevette*, etc., and finally in many cases even where the orthography has no *e*[1], has a wider lip-aperture than [ø] in feu: $\alpha 7^{be}$ βef $\gamma 5^{\varepsilon h}$ or $6^{\varepsilon h}$.

§. 122. The weak *e* [ə] of Dan., Norw. *gave*, Germ. *gabe* is βf $\gamma 5^{b}$ or 5^{bi}; α depends generally on the preceding vowel, at least in Norwegian (Brekke) and Danish, so that in *gave* it is $\alpha 6^{b}$, in *kue* $\alpha 5^{ba}$ or gliding from 3^{ab}—5.

Different variations of the German sound have been mentioned by Trautmann (*Sprachlaute* §. 985, 986); the Danish sound is also liable to different treatment according to the surroundings. In the first place it disappears entirely between two consonants formed by the same organ: in *hatten* [hadn], *find en anden* [fen,nann], *alle lande* [alllanə], *alle ni* [allni,], *ho(ve)det* [ho.ðð], *lommepenge* [lommp'ɛŋə], *det kan jeg jo ikke* [də k'ajjo ɛgə], *mange gange* [maŋŋgaŋə], etc.;[2] in *ikke engang* two vowels disappear: [ɛŋŋgaŋ,]. — Secondly when

[1] Cf. my remarks in *Phon. Stud.* II, 91, to which might be added that this [ɷ] is also frequently employed to avoid too heavy consonantgroups, as in [mœrɷfiɛœ.ɛ] *mœurs françaises*; I have also heard [larkɷdtrið.f, lʏnærfɷdlðtrig] *Parc de triomphe, le nerf de l'intrigue.*

[2] Even between two 0's: *dette tog* = [dæt.t'a.ɷ] with long 0-pause, *oppe på* = [ɔ(.)p.på.]; cf. §. 49.

a consonant follows in the same syllable, as in *gaven* [ga.vən], *gaffel* [gafəl], it is $\gamma 6^{b}$; here too it is often dropped before [n] and [l]; before an *s* in *gives* [gi.vəs] it is raised = $\alpha 6^{b}$ βf $\gamma 4^{st}$.

The third modification is so peculiar that in ordinary transcription it requires a peculiar sign [ɹ]. It is very difficult to determine exactly the formation of this [ɹ]; the whole of the tongue is lower and more retracted than in [ə]; the position approaches that of Dan. *r* : $\alpha > 6^{b}$ βgf $\gamma 6^{l}$ with, perhaps, something like $\gamma 4_{l}$ — then the γ-element has to be written 4_{l}^{st}. This sound occurs in ordinary pronunciation (1) instead of [r] after a long vowel, as in *tårne* = [t'å.ɹnə], *farlig* [fa.ɹli]; (2) instead of [rə] after a long vowel, as in *vare* [va.ɹ], *karen* [k'a.ɹn]; (3) instead of [ər], as in *gader* [ga.ɖɹ]; (4) instead of [rər], as in *varer* [va.ɹ.]. In the cases (3) and (4) the word ends voicelessly before a pause; this and the lengthening of [ɹ] in *varer*, which is, however, not very marked, are the only differences between the singular *vare* and the plural *varer*; and as they tend to disappear in connected speech, it is no wonder that uneducated people constantly write *vare* instead of *varer*, and also, for instance, *grosser* for *grosserer* [gro- sɐ,ɹ.].

§. 123. French *seau*, Germ. *so* have [o] = $\alpha 5^{ba}$ (Fr. $\alpha 5^{ab}$) βfg $\gamma 5_{l}$. — Swedish *så* : $\alpha < 5^{ba}$ βfg $\gamma > 5_{l}$. — Swed. [ɷ] in *bo* : $\alpha 3^{ab}$ βfg $\gamma < 5_{l}$. — Dan. *bo*, *sole* : $\alpha < 5^{ab}$ βfg $\gamma < 5_{l}$; unaccented as in *Otto* [ɔto] $\alpha > 5^{ab}$ βfg $\gamma < 5_{l}$; in *suk*, *bonden*, *bunden* $\alpha > 5^{ab}$ βfg $\gamma 5_{l}$.

Germ. *stock* : $\alpha 5^{ba}$ βfg $\gamma 6_{l}$; Norw. *godt*, *norsk* often the same as the German sound, often also $\gamma 6_{u}$. — Swed. *Stockholm* $\alpha 5^{ba}$ βfg $\gamma > 6_{l}$.

Engl. [ʌ] in *but* : $\alpha > 6^{b}$ βfg $\gamma 6_{l}$ or $< 6_{l}$.

Low vowels.

§. 124. French [æ] in *faire*, *tel* : $\alpha 8^{bc}$ βe $\gamma 7^{sh}$.

Danish *læse* $\alpha 8^{b}$ βe $\gamma < 7^{h}$; the same sound is not unfrequent in Germ. *er*, *ähnlich*. Dan. *læsse*, *hest* has $\gamma(<)7^{h}$, an *r* changes the sound in *ret*, *præst*, *ærgre* into $\gamma 8^{hl}$.

English *air* $\alpha 8^{b}$ βf $\gamma > 7^{h}$; some Americans make a distinction between *their* with $\gamma < 7^{h}$ and *there* with $\gamma > 7^{h}$. Eng. *man*, *mad* $\alpha 8^{h}$ βe $\gamma 8^{h}$. Swed. *lära*, Norw. *være* : $\alpha 8^{ba}$ βe $\gamma > 7^{hs}$ or (in Norw. *lærke*) even $\gamma 8^{hs}$.

§. 125. French [œ] in *peur, seul* : $\alpha 7^{ba}$ βe $\gamma 7^{sh}$. Danish *smør, kørne*, Swed. *lön* (Prof. Wulff's pronunciation) : $\alpha 7^{ba}$ βe $\gamma < 7^{h}$; Dan. *lön* has $\gamma(<)7^{t}$; Dan. *smör* 'butter', *rönne* $\gamma 8^{bl}$. Swed. *först* $\gamma > 7^{h}$ or 8^{h}.

§. 126. English [ə.] in *bird, hurt* : $\alpha 8^{bc}$ βg $\gamma 7^{t}$. Some persons make the sound higher and more advanced when originating in an $i + r$ (*bird*, also *church*) : $\gamma 5^{th}$; and in this case it seems always to have a secondary raising of the point-blade, which may also be found in the normal low [ə.| : $\beta 6_{f}$. — The unaccented vowel in Engl. *better* seems to be $\alpha 6^{b}$ $\beta 6$, $\gamma 6^{th}$; sometimes, as in *to-day* it is almost high, $?\gamma 4^{bl}$.

§. 127. English [a] in *father* : $\alpha < 8^{b}$ βgf $\gamma 7_{j}$.
German *gabe* : $\alpha 8^{b}$ βgf $\gamma > 7_{j}$.
French *pas*, Swed. *hat* : $\alpha > 8^{ba}$ βg $\gamma 7_{jk}$ or $> 7_{kj}$.
French *patte*, Swed. *hatt* : $\alpha < 8^{bc}$ βf $\gamma 7_{ij}$.
Dan. *mand, hat* : $\alpha < 8^{b}$ βf $\gamma 7_{jt}$.
Dan. *mane, gade* : $\alpha < 8^{b}$ βfe $\gamma < 7_{ij}$.
Dan. [ʌ] in *rat, kar* : $\alpha 8^{b}$ βgf $\gamma 8_{kj}$.

§. 128. English *all* : $\alpha > 7^{h}$ βg $\gamma 7_{k}$.
English *not* : $\alpha > 7^{b}$ βg $\gamma 8_{k}$.
French *tort* : $\alpha 7^{ba}$ βf $\gamma 7_{jt}$.
French *comme, dot* : $\alpha < 7^{ba}$ βf $\gamma 7_{ij}$ or 7_{jt}.
Dan. *tare* (older Eng. pron. of *more*) : $\alpha < 7^{ba}$ βfg $\gamma 7_{j}$.
Dan. *godt* : $\alpha 7^{ba}$ βfg $\gamma < 8_{j}$.

§. 129. Of course there exists — also in the languages I have dealt with — a great variety of vowel-sound besides those described above, for instance point-rise vowels ($\alpha 7^{h}$ $\beta 5^{rg}$ $\gamma 7_{j}$ in dialectal Eng. *hard*) and numerous peculiar vowel shades in diphthongs, but I think I had better publish no more of my analyses, till I see how the preceding pages are received by the phonetic public.

§. 130. I have now tried to show that such a system of notation as the Analphabetic is of great use in describing sounds occurring in living languages. It would be an easy matter to prove by a series of illustrations that it will serve the purposes of historical phonetics as well. But I shall not here enter into such a detailed proof; I wish only to call attention to one advantage of the symbols: each of them indicates but one of the numerous aspects from which a sound can be regarded. This enables us to give comprehensive

formulas of such general sound changes as have affected a whole series of sounds at once. A simultaneous change of *k* to *g*, of *t* to *d*, and of *p* to *b*, is indicated by 0 ∂0 ε3 to 0 ∂0 ε1; the 'stopping' of *f* to *p*, *þ* to *t*, *x* to *k* is simply a transition from 2 to 0; when in a certain language dental *t*, *d*, *n*, become supradental, we have *β*0′, instead of *β*0ᵉ, etc., etc.

In a few cases the separation of the sound-elements into the different 'lines' according to the active organs will help us to understand the nature of a sound change. In the Scandinavian languages we have *kustru* 'wife' from an older *kūsfrū*; and the volumes I and II of *Arkiv for nordisk filologi* contain a controversy as to the explanation of this *sfr* > *str*. On one side it was propounded that *f* was changed into *t* by a simultaneous 'heterogen dissimilation [that is 2 to 0] and homorgan assimilation' [that is *α* to *β*], while the other party found this transition inconceivable or at best highly improbable, and offered the following explanation: *f* was expelled between *s* and *r*; but wherever *s* and *r* happened to meet, a *t* was inserted. – If we view the phenomenon analphabetically, we see that the original consonant-group was: $\begin{array}{|c|c|c|c|}\alpha & ,, & 2 & ,, \\ \beta & 1 & ,, & r\end{array}$

The tongue is active, while *s* is formed, then is rests for a short time during the pronunciation of *f*, and finally has to resume its activity to form the trill nearly at the same place where it was active a moment ago. Now under such circumstances there is a tendency to avoid unnecessary movements by keeping the organ in the same position, and the *f*, as being formed with an entirely independent organ, cannot hinder the *s* and the *r* from approaching each other. We may therefore assume an intermediate stage $\begin{array}{|c|c|c|c|}\alpha & ,, & 2 & ,, \\ \beta & 1. & ,, & r\end{array}$ or rather $\begin{array}{|c|c|c|c|}\alpha & ,, & 2 & ,, \\ \beta & 1 & ,| & r\end{array}$; this is not far from the *s* and r meeting completely, while *f* is still formed; but according to the pronouncing habits of those times the transition between *β*1 and *β*r was everywhere effected through the shut position,[1] and therefore $\begin{array}{|c|c|c|c|}\alpha & ,, & 2 & ,, \\ \beta & 1 & r & \end{array}$ was only suffered to exist as $\begin{array}{|c|c|c|c|}\alpha & ,, & 2 & ,, \\ \beta & 1 & 0 & r\end{array}$.

[1] At the time when *s* + R became *ss*, as in *iss* for isR (*Arkiv*, I. 296), the R was probably not yet a trill, but z or perhaps *β*2ᶠ (*γ*3ᵉ?) *ε*1, cf. the Faeroic *r*, §. 193.

This combination is not difficult to pronounce, but it will be seen that the $\alpha 2$-articulation is superfluous (as the $\beta 0$ hinders it from being heard), and the *f* is, therefore, naturally left out by the younger generation learning the word by the ear. A similar process has taken place in French, where *une petite* is very often pronounced [yntit]:

α	,,	0	,,	is developed into	α	,	0	,	where eventually $\alpha 0$ is		
β	0	,,	0		β	0		..			
δ	2	0	..		δ	2		0			

dropped because it cannot be heard on account of the $\beta 0$.

In metrical disquisitions Analphabetic symbols (ζ_4, etc.) might also be used with advantage.

APPENDIX.

> It is not too much to say that all old phonetic nomenclature and classification should be carted away as rubbish.
> Ellis, *On Glossic* 93.

The following list of phonetic terms with their Analphabetic correspondents does not pretend to be complete. In the first place it only comprises such terms and such meanings as are found in the works of modern professional phoneticians — the oldest work quoted is Lepsius: *Standard Alphabet*, 1863. And secondly I have admitted only English, German and French words, giving from the Scandinavian phonetic litteratures only such terms as are formed on an international (Greek or Latin) basis. I have also excluded a great many *sesquipedalia verba* such as Techmer's *mittelzungenlippenlängsöffner* and *mittelzungenlippenrundöffner*.

If I had included the vague and equivocal terminology used in many philological works, not to speak of practical grammars, etc., my list would have been much longer than it is; as it is, I think it is long enough to prove that the ordinary phonetic nomenclature is far from being so definite, clear and unambiguous, as a scientific nomenclature ought certainly to be.

ACUMINAL = βx^s (Böhmer).

AFFRICATA = ($\alpha\beta\gamma$) 0 δ 0 followed by homorgane 1 or 2 δ0 [sometimes ε3 is implied in the term].

ALVEOLAR (1.) = βx^{fs} or x^f (Brücke, Sievers, etc.)

(2.) = βx^{fs} or x^{ef}, not f (Bonaparte in *EEP.* IV, 1354; Techmer).

(3.) = βx^f, not ef (? Storm, *E. Ph.* 38 cf. 428).

ALVEOLO-DENTAL = βx^{c} (Bonaparte, *EEP.* 1353; ?ef).
ANCIPITES = r and i, ii (Lepsius).
ANTECACUMINAL = gf (Michaelis).
ANTEDORSAL = βx_{a} (Victor, 1. ed., cf. 2. ed. p. 135, 137 in spite of §. 82 Anm.).
ANTIPALATAL = γx^{g} and thereabouts (Kräuter, Vietor).
APERTURE (1.) = anything but 0.
(2.) = 3, 4, etc. not 1, 2, i, ii (Techmer: apertura).
APICAL = βx^{a} (Michaelis, Techmer, Vietor², Sweet *Elb.*).
ARCHED FRONT = *s*-sounds (Ellis, *Pron. f. Singers* 79).
ASPIRATE = $\varepsilon 2$, described as $\varepsilon 3$ (Bell, *V. S.* 45).
ASPIRATED, ASPIRATA = $(\alpha\beta\gamma)0\ \delta 0\ \varepsilon 3$ followed by $y\varepsilon 3$—1 as described above, §. 79.
ASSIBILATED = $\beta 0\delta 0$ followed by β (or γ) 1.
BACK (1) = γx_{u} and y_{u} (Bell, Sweet).
(2) = γx_{j} or x_{u} not x_{i} (Evans, *Sp. Exp.* II, 109).
BACK-MIXED = $\alpha 3$ or 5 $\gamma 2_{i}$ (Bell).
BIDENTAL (1.) = [š ž] (Michaelis).
(2.) = βde γ_{e}x (Seelmann, *Aussspr. d. Lat.* 246).
BILABIAL = αx^{a}.
BILABIODENTAL = $\alpha^{b}_{c}0$ (Franke, cf. §. 55).
BILATERAL = i, ii.
BLADE = $\gamma^{c}x$ (Sweet).
BLADE-POINT = βx_{a} (Sweet).
BLÄHLAUT = $\varepsilon 1$ during $(\alpha\beta\gamma)0\ \delta 0$.
BREATH (1.) = ζ + without any regard to *s*-status.
(2.) = $\varepsilon 3$ (Sweet).
BUZZ = $\alpha\beta\gamma 1$, (2) $\varepsilon 1$.
CACUMINAL = βx^{g} (Max Müller, etc.).
CATCH, GLOTTAL = $\varepsilon 0$ (Bell, Sweet).
CENTRAL = anything but i, ii (Ellis); central continuous consonants = all consonants except 0, r, and i, ii (Sayce, *Introd. to the Sc. of Language* I, 270).
CENTRE = γx^{h} or ' (Evans).
CEREBRAL (1.) = βx^{g} ($\beta^{g}x$).
— (2.) = βx^{d} and x^{g} (Storm, *Nord. tidskr.* 1880, 242).
CHECK = 0.

CHUCHE = whisper (Passy, *si* described as $s<z$).

CITRADENTAL = $\beta 0_d$ ('tip of tongue protruded between upper and lower teeth', Ellis *EEP.* 1120).

CLAQUEMENT = click, q. v. (Passy).

CLAUSURA = 0 (Techmer).

CLICK = $\zeta 0$, $(\alpha\beta\gamma)$ $0'_{,,}$ or $0\,i$, etc.; also for instance:

$$\begin{array}{|c|c|c|c|c|c|c|} \alpha & 0^{b-d} & ,, & \text{or} & \beta & 0 & ,, \\ \zeta & \div 4 & & & \gamma & 0 & .. \end{array}$$

CLUSIL = 0.

CONSONANT (1.) = $(\alpha\beta\gamma)$ 0, i, ii, r, ɪ, or ɜ.

(2.) = non-syllabic, ζx (§. 50).

(3.) = $(\alpha\beta\gamma)$ 0, i, ii, r, ɪ or ɜ and besides ζx (Techmer).

CONTACT = 0 (Ellis).

CONTINUOUS (Sayce), CONTINUA, CONTINUANTS (Evans), CONTINUIRLICHE LAUTE, DAUERLAUTE = $(\alpha\beta\gamma)$ ɪ and ɜ, sometimes also comprising i, ii, and $(\alpha\beta\gamma)$ $0\jmath_2$.

CORONAL (1. from corona linguae) = βx^a (Sievers, Victor[2]).

(= βx_a? Seelmann: 'der vordere saum').

(2. from corona palati) = βx^f (Ellis, *EEP.* 1096).

(CUSPIDILINGUALI-FRONTIPALATAL = ? βx^g, formed jestingly by Evans, II, 83).

DAUERLAUT = continuous, q. v. (Kräuter comprises under *d.* also $\alpha\beta\gamma 0$ $\eth 0$ $\varepsilon\imath$).

DENTAL (1.) = β (x^a and x_a) (Lepsius, Victor).

(2.) = βx^a except x^g (Evans, Sievers).

(3.) = βx^d and x^e (Brücke).

(4.) = βx^e (Ellis, Storm, Passy).

(5.) = βx^d (Bonaparte).

DENTICORONAL = βx^c? (Seelmann).

DENTIGINGIVAL = βx^f? (Seelmann).

DENTILABIAL = $\alpha_d x$ (Whitney, Lundell, etc.; Passy, *Sons du Fr.*)

DENTILINGUAL = βx^e (or x^d) (Whitney, *Life and Growth* 65).

DENTIPALATAL = γx^f (Lundell).

DENTOLABIAL = $\alpha_d x$ (Sweet, *Elementarb.*; Passy, *Phon. Stud.* I, 39).

DIESZ = $\alpha\beta\gamma$ 0, ɪ, ɜ, i, ii, r (Trautmann).

DIPHTHONG = $\alpha\beta\gamma \mid y \mid y \mid$ (falling, after-glide diphth.);
$\zeta \mid y \quad x \mid$
$\alpha\beta\gamma \mid y \mid y \mid$ (rising, fore-glide diphth.).
$\zeta \mid x \quad y \mid$

DIVIDED = i, ii, etc. (Bell).

DIVIDUÆ = $\alpha\beta\gamma 0$ (Lepsius).

DOPPELLIPPIG = αx^s (Beyer).

DORSAL (1.) = $\gamma^f x$ or $^{\circ}x$ (Brücke, Seelmann).
(2.) = βx_s or $\gamma^s x$ (Michaelis, Victor, Techmer).
(3.) = βx_s and the whole of γ (Sievers).

DORSAL-ALVEOLAR = $\gamma^f x$ (Sievers[1] 61).

DORSAL-DENTAL = $\gamma^{\circ} x$ (ibd.).

DORSO-APICAL = βx_c (Victor).

DOUBLE ALVEOLAR, DOUBLE PALATAL, DOUBLE GUTTURAL = ? (Bonaparte).

ENGELAUT = $\alpha\beta\gamma$ 1 and 2.

EXPLODENT = 0 (Ellis, Evans).

EXPLOSIVE (1.) = 0 with on- and off- glide.
(2.) = [0]-, only the off-glide (Leffler, Sievers; Seelmann uses the term when speaking of the off-glide of ii, ŧ, ɪ, as well as of 0).
(3.) = $\alpha\beta\gamma 0$ $\eth 0$ $\varepsilon 3$ (Merkel).

FAUCAL (1.) = ε (Lepsius, etc.).
(2.) = $\eth 0$ or rather the glide in $\eth 0|2$ and $\eth 2|0$ (Kräuter).

FIXED = $\alpha\beta\gamma$ 1 or 2 (Ellis).

FLAP = r (central flap) and i, ii (lateral flaps, Ellis).

FLAT (1.) = εɪ.
(2.) = γx^t ('the flat of the tongue', Whitney).

FLATED = $\varepsilon 3$ (Ellis).

FORTIS = 0 (Winteler, Sievers; also of other consonants than 0).

FORWARD = β (Sweet, *Hist. of E. S.*).

FRICATIVA = $\alpha\beta\gamma$ 1 and 2.

FRONT = γx^c (Bell 1867; Sweet), cf. mixed.

GALM = $\alpha\beta\gamma$ 3, 4, etc. (Trautmann).

GAUMING = g, h, i, j. (Trautmann).

GERÄUSCHLAUTE = $\alpha\beta\gamma$ 0, 1, 2, (i), $\eth 0$.

GINGIVAL (1.) = βx^{dc} (γx^{t}) or βx_{dc} (Thomsen, Hoffory).

(2.) = βx^{fc} (Whitney, *Or and Linguist. St.* II, 245).
(3.) = βx^{fc} (subgingival), βx^{fg} (supragingival, Seelmann). Cf. also Ellis, *EEP.* IV, 1095.

GLOTTAL = ε (Sweet).

GLOTTID = 'the action of the vocal chords in altering the form of the glottis or tongue-shaped space between them: (1) clear = $\alpha\beta\gamma \begin{vmatrix} y \\ 1 \end{vmatrix}$; (2) gradual = $\begin{vmatrix} y \\ 3)1 \end{vmatrix}$ or $\begin{vmatrix} y \\ 1\,(3 \end{vmatrix}$; (3) check = $\varepsilon 0$; (4) the bleat = $\varepsilon 0^g$ (Ellis, *Speech Sounds*, in *Enc. Britt.*).

GLOTTIDAL = ε (Evans).

GUTTURAL (1.) = ε ['gutturales verae'] (Bell, not always; Kräuter, Evans p. 109).
(2.) = γx_z (from (h?) i to k) (Lepsius, Sievers, Victor, Beyer, Evans p. 81).
(3.) = $\gamma x_{i,j}$, not x_k (Storm, *Norvegia* I, 113).
(4.) = γx_l ($x_{k,l}$) (Lyttkens-Wulff).
(5.) = both ε and γx_z except γx_l which is termed ultra-guttural (Bonaparte).
(6.) = 'guttural l' often = βii $\gamma 3$ cf. §. 90.

GUTTURALIZED (1.) = εi or $\varepsilon 2$ (Bell, *V. S.* 40).
(2.) = modified by $\gamma 2$ (Bell, *V. S.* 80).

GUTTURAL-LABIAL = $\alpha 3$ γy_z (Storm, *E. Ph.* 69).

GUTTURAL-NASAL, of French nasal vowels (Storm, etc.; cf. §. 42).

GUTTURAL-PALATAL vowels = mixed (Storm, Sievers, Sweet *Elb.*).

GUTTURO-DENTAL = βx^e γx_z (Bonaparte).

GUTTURO-LABIAL = $\alpha 1$ $\gamma 2_i$ (Sweet, *Elb.*).

GUTTURO-NASAL = guttural-nasal (Sweet, *Hdb.* p. 122).

GUTTURO-PALATAL = βx^f γx_z (Bonaparte).

HIGH (vowel) = $\gamma 3$, 4 (Bell, etc.).

HINTERE (vokale) = γy_z.

HINTERGAUMING = $\gamma x_{h,i}$ (Trautmann).

HISS = [α]$\beta\gamma 1$ (or 2) $\varepsilon 3$ (Ellis, *Pron. f. Singers* 71, 74).

HUM = $\alpha\beta\gamma 0$ $\delta 2$ $\varepsilon 1$ (Ellis).

IMPLODENT = $\alpha\beta\gamma 0$ $\delta 0$ $\varepsilon^0 0$ (Ellis, *Pron. f. S.* 62, 64: larynx closed by the epiglottis).

IMPLOSIVE (1.) = -[0], the on-glide to a shut consonant (Leffler Seelmann, etc).

(2.) = $u\beta\gamma 0\ \delta 0\ \varepsilon 0$ (Merkel, Sievers, Sweet *Hdb.* §. 224)
= implodent.
(3.) = $\delta 0|3$ during $\alpha\beta\gamma 0$ (*t* in *tn*, Storm, *Norvegia* 31).
(4.) = ζ : (Storm, *ibd.*).

INQUANTITATIVE vowel = yζx (Evans).

INSPIRATED, INSPIRATION = ζ ∴ (Sievers, Techmer, etc.).

INSTANTANÉE = 0, also $\alpha\beta\gamma 0\ \delta 2$ (L. Havet).

INTERDENTAL = βx^{d}; it seems never to be used of $\alpha_{d}x$.

INTERLABIAL = αx^{z} (Evans)

INTERSTITIEL = (air escaping between the upper front teeth; Sievers).

INTONATED = *s*1 (Whitney).

INVERSE = ζ ÷ (Passy).

INVERTED = βx^{δ} or $\beta^{\delta}x$ (Sweet).

JERK = 'sudden increase of pressure, followed by a decrease' (Ellis, *EEP.* 1130), ζ [2] 4 [2] or [1] 4 [1], etc.

KEHLKOPF- [verschlusslaut] = ε[0].

KLAPPER = $\alpha\beta\gamma 0$, i, ii, also $\alpha\beta\gamma 0\ \delta 2$ (Trautmann).

KLAPPLAUT = klapper (Seelmann).

LABIAL = α (sometimes only used of αx^{z}).

LABIALIZED = α (1), 3, 5, 7.

LABIODENTAL = $\alpha_{d}x$ (Brücke, etc.).

LABIOLABIAL = αx^{z} (Techmer).

LABIOPALATAL — used by Passy for Fr. [ɥ], see § 101.

LABIOVÉLAIRE = $u3\ \gamma 2$ (Passy, Fr. [w]).

LAMINAL = γx^{δ} (Böhmer).

LARYNGAL, LARYNGEAL (Sayce) = *s*.

LATERAL = i, ii (iii).

LATERALER VERSCHLUSSLAUT = (β) 0 before ii (Fr. Beyer also speaks of a 'lateral *l*' = βii after β0! Franz. phonetik, 50).

LENIS = *o* as opposed to 0 (Winteler, Sievers; also *1*, *2*, etc.).

LINGUAL (1.) = β and γ.
(2.) = β (Whitney).
(3.) = βx^{δ}.
(4.) = βx γ2? (Lepsius, *St. Alph.* 74: a dental and a guttural movement of the tongue are combined).
(5.) = α 4, 6, 8 γγ (= not round vowel, Bell, *V. S.* 87).

LINGUOFRONTAL = βx_{δ} or $\gamma^{\delta}x$ (Lenz).

LINGUODENTAL (1.) = βx^c (Techmer).
(2.) = β (Beyer).

LINGUOLATERAL = βi, ii (Techmer).

LINGUOPALATAL (1.) = β and γ (Sievers).
(2.) = βx_z and γ not further back than i (Techmer).
(3.) = βx^s (Beyer).

LIP — α.

LIP-BACK = α1 γ2 (w, Sweet) = LIP-MIXED (Bell).

LIP-TEETH = α_4x (Sweet).

LIQUID (1.) = i, ii (Evans).
(2.) = i, ii and r.
(3.) = i, ii and $\alpha\beta\gamma$0 ∂2 ε1 (Passy).
(4.) = r, ii, not i (nor < r or < 2 ?) 'only those kinds of *r* and *l* which stand to the spirant *r* and *l* in the same relation that the vowel *i* stands to the spirant *y*' (Sayce, *Introd.* I, 271).

LOW (vowel) = γ 7, 8 (Bell, etc.).

MARGINAL = βx^{de} (Michaelis).

MEDIA (1.) = 0ε1 (Kräuter, Victor[2]) — so that *[b]*, § 78, is termed a weak tenuis.
(2.) = *o* (Brücke, Hoffory, Victor[1]) so that *[b]* is termed a whispered or reduced media.

MEDIAN = anything but i, ii, etc. (Techmer, Victor).

MEDIOALVEOLAR = γ^rx (Lyttkens-Wulff).

MEDIOPALATAL (1.) = γx^h (Kräuter, Lundell).
(2.) = γx^s (Storm, Seelmann, Beyer).

MID (vowel) = γ 5, 6 (Bell, etc.).

MID-PALATAL = γx^h (Evans).

MITTELGAUMING = γx^s (Trautmann).

MITLAUT (1.) = consonant (1.)
(2.) = consonant (2.)

MITTELLAUTER = i, ii, r (Trautmann).

MIXED = simultaneous γy^s and γy_z (Bell, *V. S.*, Evans), or intermediate between both (Sweet, hesitatingly; Bell, *Sounds and th. Rel.*). — It would, perhaps, have been better in my symbols to subdivide γ into four parts (cf. § 19):

$\gamma^c x$ = blade; $\gamma_a x$ = front; γx^e = middle part of the tongue; γx_z = back.

MOMENTANEOUS = $\alpha\beta\gamma 0\ \delta 0$.

MOUILLÉ = $\beta x\ \gamma z^s$ or 3^s.

MUND (-vokal, etc.) = $\delta 0$.

MUNDÖFFNER = $\alpha\beta\gamma$ 3, 4, etc. (Techmer).

MUNDSCHLIESSER = mundschluss $\alpha\beta\gamma 0$ and mundenge $\alpha\beta\gamma$ 1, 2, i, ii, r (Techmer).

MUTE = $0\delta 0$.

NASAL = δ (1), 2, 3; Techmer: nasal = δ 2, 3; näselnd = δ1.

NASALIZED = δ 2, 3, except $\alpha\beta\gamma 0\ \delta 2$.

NASENEXPLOSIV = glide from $\delta 0$ to $\delta 2$ during $\alpha\beta\gamma 0$ (Sievers).

NASO-GUTTURAL — (of French nasal vowels, Bell, *V. S.* 77; cf. § 42).

OCCLUSIV = $\alpha\beta\gamma$-[0] (Sievers).

OPEN = $[\alpha\beta\gamma]$ 1 or 2 (Bell, Sweet).

ORAL (1.) = $\delta 0$.

(2.) = actions of $\alpha\beta\gamma$ (Techmer).

(3.) = βx^s (Sievers 1).

(4.) = not i, ii (Sayce, *Introd.* I, 271; cf. 276, where it seems opposed to alveolar and dorsal, = ?).

ORINASAL = $(\alpha\beta\gamma)$ y $\delta 2$ (Ellis).

PALATAL (1.) = γ from g to j (k).

(2.) = γ between f and h.

(3.) = βx^f (Bonaparte).

(4.) = palatalized.

PALATALIZED = (β or γ modified by) γz^s or 3^s.

PALATINE, rare = palatal.

PALATOLINGUAL = β and γ (Beyer).

PHARYNGAL = s (Evans).

PHON = ζ y (Techmer).

PHTHONGAL = $s\imath$ (Whitney).

PHYSEM = 'the bellow actions of the lungs' (Ellis) = ζ [0] 4.

PLATZLAUT = 0 or [0]- (Beyer).

PLOSIV = 0 ($\delta 0$), the 'pause' itself without the on- or the off-glide.

POINT = β or βx^c (Bell, etc.).

POINT-TEETH = βx^d or x^e (Sweet).

POINT-MIXED (1.) = š (Bell, *Vis. Sp.*).

(2.) = s (Bell, *Sound and th. R.*).

POSTALVEOLAR (1.) = γx^{fg} (Lyttkens-Wulff).

(2.) = βx^f (Beyer, Techmer).

POSTASPIRATED = aspirated (Ellis).

POSTCACUMINAL = gh (Michaelis).

POSTCORONAL = βx_z (Vietor 1 ed., cf. Vietor^2 140 in spite of p. 125).

POSTDENTAL (1.) = βx^e (Lundell, Sievers, etc.).

(2.) = βx^{fe} (Lyttkens-Wulff).

POSTPALATAL (1.) = γx_j or x_k (Lundell).

(2.) = γx_i (Kräuter, Vietor).

(3.) = γx_h (Lyttkens-Wulff, Seelmann).

POSTVELAR = γx_j (Seelmann).

PRÆALVEOLAR = γx^{fe} (or βx_{fe}, Lyttkens-Wulff).

PRÆDENTAL = βx^d and βx^e (Lyttkens-Wulff).

PRÆPALATAL (1.) = γx^g (Lundell).

(2.) = γx^f (Storm, *Norv.*).

(3.) = βx^g or x^{gf} (Seelmann, cf. Passy, *Sons du Fr.* 12).

PRÆVELAR = γx_i (Seelmann).

PRIMARY (1.) = $\alpha\beta\gamma 2$ (pr. or centre-aperture consonants, Bell, *V. S.*).

(2.) = γ 3, 5, 7 (pr. vowels, Bell).

PROHIBITIVLAUT = -[0] (Sievers).

PROTRUDED (1.) = αx^a (lips pr.).

(2.) = βx^b (Bell).

RECOIL = [0]-.

REDUCED = () or >.

REIBELAUT = 1 or 2.

RESONANT = $\alpha\beta\gamma 0\ \delta 2$ (Brücke, Lundell).

RETRACTED = βx^{gf} or x^{fg} (Ellis).

REVERTED = $\beta^g x$ (Ellis, Evans).

RISE = $\beta 2$ ('untrilled r', Ellis).

ROUND = α (1), 3, 5, 7.

SAUGLAUT, SCHNALZLAUT = click, *q. v.*

SCHLAGLAUT, STOSSLAUT = klapper, q. v.

SCHLEIFER = ($\alpha\beta\gamma$) 1 and 2 (Trautmann).

SELBSTLAUT (1.) = $\alpha\beta\gamma$ 3 or more.

(2.) = ζ y.

SEMIVOWEL = $\alpha\beta\gamma > 2$ or < 3, sometimes also ii and r, all with $\varepsilon 1$.

SHARP = $\varepsilon 3$.

SHUT = 0 [$\varepsilon 0$ and $\alpha\beta\gamma$ $0\partial 0$, not $\partial 0$ by itself].

SIBILANT = ($\beta\gamma$) 1 (Whitney, Evans).

SIDE = i, ii (Sweet).

SILBIG (silbisch) = ζ y.

SIMPLE CONTINUANT = $\alpha\beta\gamma 2$ $\partial 0$ (Evans).

SIMPLE EXPLODENT = $\alpha\beta\gamma 0$ $\partial 0$ ε (? 0 or 3 without post-aspiration; Evans).

SNORT = $\alpha\beta\gamma 0$ $\partial 2$ $\varepsilon 3$ (Ellis).

SONANT (1.) = $\varepsilon 1$.

(2.) = $\zeta\gamma$.

SONOR = $\varepsilon 1$; $\alpha\beta\gamma$ not 0, i, 1, 2 (Sievers).

SOUFLÉ = $\varepsilon 3$ (Passy).

SPIRANT (1.) = $\alpha\beta\gamma$ 1 or 2 and $\varepsilon 2$.

(2.) = $\alpha\beta\gamma$ 2 (not 1, Whitney).

SPIRITUS ASPER = $\varepsilon 2$.

SPIRITUS LENIS = $\varepsilon 0$ (?).

STIMMHAFT = $\varepsilon 1$.

STIMMLOS = $\varepsilon 3$.

STOP = 0 (Sweet).

STRAIT = ($\alpha\beta\gamma$) 1 or 2 (fixed) and i, ii, r (flaps; Ellis).

STRICTURA = 1 or 2 (Techmer).

STRONG (1.) = ($\alpha\beta\gamma$ 0, 1, etc.) ε not 1.

(2.) = $\zeta 4$ (3).

SUBDENTAL = βx^{de} (Seelmann).

SUBGINGIVAL = βx^{de} (Seelmann).

SUMMLAUT = $\alpha\beta\gamma$ 1 or 2 $\varepsilon 1$ (= buzz, Beyer).

SUPERFICIAL = βx^{e} (Michaelis).

SUPRADENTAL (1.) = βx^{f} (Lundell, etc.).

(2.) = βx^{e} (Seelmann).

SUPRAGINGIVAL = βx^{f} or x^{dz} (Seelmann).

SURD = ε3.

SYLLABIC = ζγ.

SYMPHON = ζx (Techmer).

TENUIS (1.) = αβγ0 ð0 ε not 1.

(2.) = 0; cf. *media* above.

THROAT = ε.

TÖNEND = ε1 (Brücke, etc.).

TONLOS (1.) = ε3 (or rather ε not (1).

(2.) = ζ 1 (or 2).

TOP = γx^{s} (Bell, *Sounds and th. R.*).

TREMULANT = r.

TRILL = r (Bell, etc.).

ULTRAGUTTURAL = γx, (Bonaparte).

ULTRAPALATAL = $\beta^{s}x$ (Bonaparte).

UNIDENTAL = s (and þ), not š (Michaelis).

UNILATERAL — l, ll.

UNSTOPPED = not 0 (generally 1, 2, i, ii, r, but not used of vowels).

UVULAR (trill) = $\eth 0_{r}$.

VELAR (1.) = γx_{i} and x_{j} (Passy, Lyttkens-Wulff, etc.).

(2.) = ð0|2 or 2|0, especially during αβγ 0 (Sievers, etc.).

VELOLINGUAL = γx_{i} and x_{j} (Merkel).

VELOPHARYNGAL = velar, 2 (Michaelis).

VERSCHLUSSLAUT = 0, except ð0 and αβ;0 ð2.

VIBRANT = r (Evans).

VOCAL (1.) = ε1.

(2.) = αβγ > 2 or < 3 ε1 (Evans).

(3. in German and Scandinavian languages *vokal* = vowel).

VOCALIC = ε1.

VOICED = ε1.

VOICELESS = ε3 (ε2).

VORDERGAUMING = f (Trautmann).

VORDERR (vocale) = γy^{c}.

VOWEL (1.) = αβγ 3 or more.

(2.) = ζγ.

(3.) = αβγ 3 or more, only when ζγ (Techmer).

WEAK (1.) = $\varepsilon 1$.
(2.) = o, etc.
(3.) = $\zeta 1$ (2).

WHEEZE = $\varepsilon 2^{\circ}$? (Ellis).

WHISH = $\beta\gamma > 1$ (š, Ellis).

WHISPER = εi, cf. § 44.

WIDE vowel, cf. § 24, 25, 31—37. — Wide consonant (Sweet) = > 1, > 2?

ZAHNING = βx° and $x_{\circ}$ (Trautmann).

ZAHNLIPPIG = $\alpha_4 x$ (Beyer).

ZITTERLAUT = r.

ZISCHLAUT = $\beta\gamma 1$.

ZUNGEN-BLATT, -RÜCKEN, -SAUM, -SPITZE, -WURZEL as translations of Sweet's blade, front, blade-point, point, back (Western, Beyer).

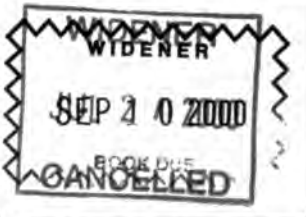




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